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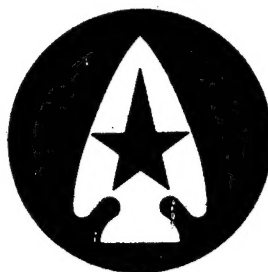
SYSTEMS ANALYSIS
TEST AND EVALUATION

(SATE)

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A REPORT
OF A MANAGEMENT SURVEY CONDUCTED BY
THE SATE STUDY GROUP



VOLUME II

ANNEXES

13 March 1972

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1. AGENCY USE ONLY (Leave blank)	2. REPORT DATE 13 March 1972	3. REPORT TYPE AND DATES COVERED Final		
4. TITLE AND SUBTITLE Systems Analysis Test and Evaluation (SATE): A Report of a Management Survey Conducted by the SATE Study Group. Volume 2, Annexes		5. FUNDING NUMBERS		
6. AUTHOR(S) Curtin Chapman; John P. Stewart;; Mark G. Pell; James L. Templeton; Peter R. Bankson; Arnold L. Larsen; Oscar Wells				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) US Army Combat Developments Command ATTN: CDCDG Fort Belvoir, VA 22060		8. PERFORMING ORGANIZATION REPORT NUMBER		
9. SPONSORING / MONITORING AGENCY NAME(S) AND ADDRESS(ES)		10. SPONSORING / MONITORING AGENCY REPORT NUMBER		
11. SUPPLEMENTARY NOTES See also Volume 1				
12a. DISTRIBUTION / AVAILABILITY STATEMENT Approved for public release; distribution is unlimited		12b. DISTRIBUTION CODE		
13. ABSTRACT (Maximum 200 words)				
14. SUBJECT TERMS			15. NUMBER OF PAGES	
			16. PRICE CODE	
17. SECURITY CLASSIFICATION OF REPORT UNCLASSIFIED	18. SECURITY CLASSIFICATION OF THIS PAGE UNCLASSIFIED	19. SECURITY CLASSIFICATION OF ABSTRACT N/A	20. LIMITATION OF ABSTRACT N/A	

FOREWORD

This study examines how systems analysis and test and evaluation can be improved within the combat developments process. The study responds to a 16 December 1971 directive from the Commanding General, USACDC, to the Deputy Commanding General, USACDC. That directive requested the DCG to take whatever measures are necessary to develop answers to the following questions.

a. Given our currently authorized resources, what is the most feasible, best balanced schedule for FY 1972-1973 for CDC to execute its responsibilities for the entire array of tests and experiments, including but not limited to, DST, ET/ST, EST, Troop Test, ICTT, CDEC Experiments, MASSTER Test, Joint Tests, etc?

b. In light of the growing demand for more and better testing and evaluation of military equipment (and related concepts, doctrine and organization), what is the best way for CDC to organize and distribute its resources (including related ORSA assets) for (1) field experimentation, and (2) analysis and evaluation of tests and experiments?

Volume I contains the basic report -- the results of our analysis of the issues, conclusions and recommendations. This volume contains our detailed analysis of the basic issues -- the CD Process, Concept of Operations, Systems Analysis, Test and Evaluation, and HQ CDC. This report could not have been prepared without the major assistance provided by CDEC, the Groups and members of HQ CDC, all of whom supported the SATE Study Team.

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ANNEX A TO SATE STUDY GROUP REPORT

THE COMBAT DEVELOPMENT PROCESS

1. General. Combat development for the Army in the field follows a complex process that varies somewhat from the ideal for each system under development. A simplified portrayal of the process is shown below.

BASIC COMBAT DEVELOPMENT PROCESS

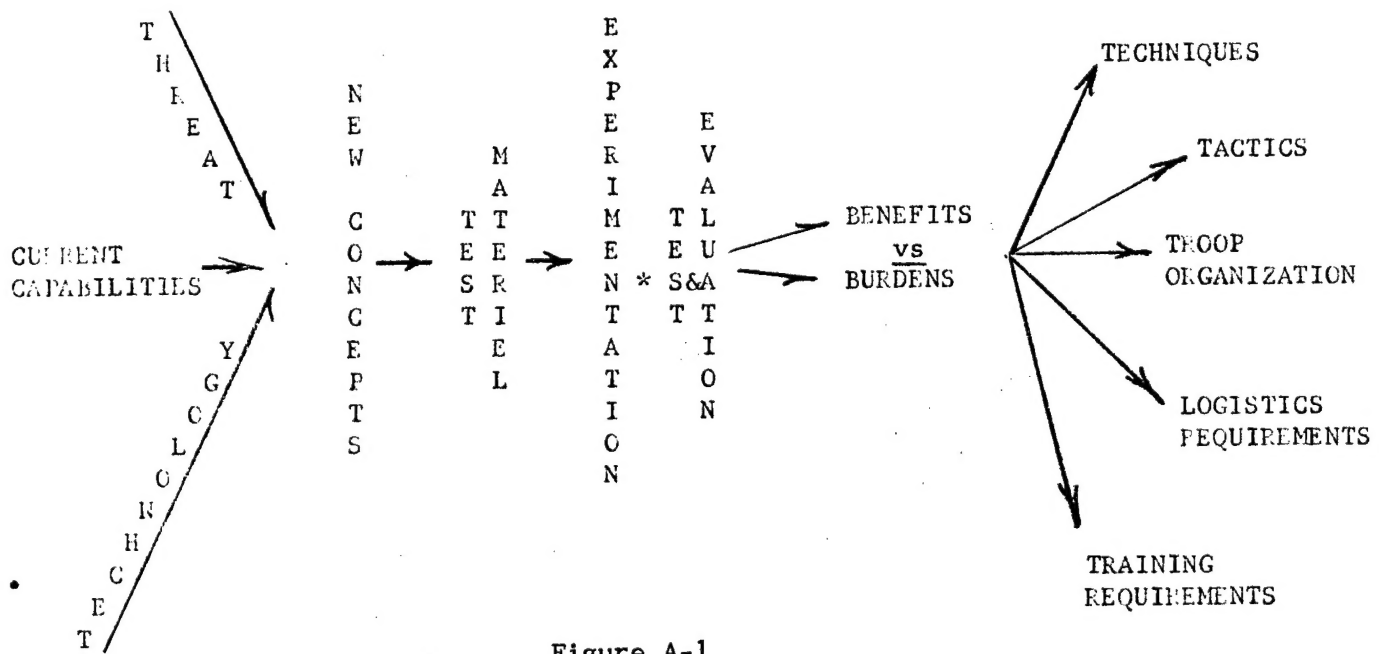


Figure A-1

a. First, we analyze the threat and attempt to direct our current capabilities in order to meet it in the best possible way. We determine to what extent and in what ways we are lacking in the ability to meet that threat. Then, we look for the technology to meet these needs.

b. If we think we are not meeting the threat in a given area, we begin looking toward new concepts and technology which will overcome this shortfall. These concepts lead to development of the needed materiel, which is tested to insure that it is technically suitable.

c. The initial test of the isolated item is followed by experimentation, test and evaluation of the item as it will be used in the field in conjunction with the units and with other materiel.

d. Then, we come to the final evaluation -- finding out whether the "benefits" outweigh the "burdens." Sometimes a threat can be met, but the burden of meeting that threat in a particular manner is out of proportion. This is a hard thing to see sometimes, but we must discipline ourselves and not be blinded by our own enthusiasm for a new product or concept. If the burdens are too great, we go back to the drawing board and try a new way to meet the threat. Once we are satisfied that we are not getting more burdens than we are benefits, then we move toward establishing techniques, tactics, organizations, logistics, and training into which we can integrate the new development.

e. In this process, USACDC normally acts as the overall planner, integrating the operational doctrine, materiel, automation and organizational

structures needed to implement new concepts for the Army. In this role, CDC is the representative of the future Army, the user's representative, insuring that the Army continues to develop a balanced capability to fight, support itself, equip and organize within existing constraints, to accomplish its assigned tasks.

1.2 CDC Responsibilities are extensively detailed in more than 20 regulations, many of which are currently under revision. In the area of test and evaluation detailed guidance to implement the mission assigned to CDC in late 1971 has not been published by HQ DA; therefore, this SATE report is based on the best guidance available. The mission of USACDC as assigned in AR 10-12 is:

"GG CDC, will research, formulate, develop, test and evaluate, recommend and document new or improved concepts, doctrine, materiel needs and organizations for --

- (1) The Army in the field in all combat environments.
- (2) Army participation in the unified defense of the United States against air and missile attack, in coordination with the CG, US Army Air Defense Command.
- (3) Army support of U.S. civil authorities in civil disturbance and civil defense.

b. Determine, in anticipation of the nature of land warfare in the future, the kinds of forces and materiel needed and how these forces and

materiel should be employed.

c. Design the Land Combat System for the Army in the field for approximately 20-years in the future.

d. Direct, manage and/or conduct operational tests and evaluations and field experiments for the Army in the field.

e. Make recommendations to Headquarters, Department of the Army in regard to the above matters. (Portions underlined are additions recommended by CDC in a revision to AR 10-12, currently being coordinated within the command).

1.3 Combat Development Life Cycles.

a. An Army combat development can be described by referring to all or part of one of the life cycle models published by HQ, DA. Two life cycle models have the greatest impact on the CDC concept of operations; the Life Cycle Management Model for Army Systems (LCMM) as described in AR 11-25 and DA Pam 11-25 (both in draft form currently), and the Army Management Information System (AMIS) life cycle model, described in AR 18-1 (also under revision). These two models both describe the development of Army systems. Although some attempt has been made to distinguish between the types of systems described by each, there is no clear relationship established between the two, and no procedural method for determining which life cycle should be followed in the development of a new concept. The detailed development of

a relationship between these two models and procedures for determining which model is applicable to a particular development is beyond the scope of this report. Preliminary work has been done in this area, and this lack is identified as one of the major management issues to be addressed subsequent to the completion of this report.

b. The LCMM depicts the procedure for acquisition of Army materiel. It is designed to insure fully integrated doctrinal, organizational and materiel development of the most effective Army possible, within allotted resources. The model is designed as a guide, to insure that each item is fielded as a complete system to include trained personnel, logistic support, technical literature and an approved doctrine and organization for employment. The LCMM forms the basis for discussions in the SATE report. A more detailed description of the LCMM is attached as Appendix A-1.

c. The AMIS life cycle is applicable to the development of automated systems for multi-command use, which can be implemented using commercially available automated data processing equipment (ADPE). Development procedures for these systems are established in AR 18-1, which is currently undergoing revision by the proponent to document the role of CDC in this aspect of development for the Army in the field. Although the development of automated systems requires the application of Systems Analysis resources by CDC, and these systems undergo a number of tests and evaluations prior to full implementation, the impact of this life cycle has not been considered for the following reasons:

(1) Combat developments actions by CDC under the current version of AR 18-1 are severely limited in scope, and can be considered as separate actions within the framework of the LCMM.

(2) The nature and extent of CDC responsibilities under the revised regulation are not known at the present time, and accurate workload estimates can not be made.

d. During the preparation of this report, the LCMM was revised by the SATE Study Group to reflect accurately the current responsibilities of CDC. The tasks identified as responsibilities of CDC were examined to determine if either Systems Analysis or Test and Evaluation resources were required. These tasks are listed sequentially, by major phases of the defense systems acquisition process, in Appendix A-2. Those tasks with a potential requirement for Systems Analysis or Test and Evaluation are so indicated. For clarity, the product or result of each task is also listed.

e. The LCMM is , in essence, a flow chart or PERT (Program Evaluation and Review Technique) diagram showing the sequence in which inter-related actions must take place to insure continuous development and acquisition of a balanced system of effective doctrine, automation, organization and materiel. Throughout the cycle, these four elements are being developed simultaneously. During many portions of the life cycle, materiel development requires the greatest time or resources, and other elements are constrained to move at the speed of the materiel development. At other times,

automation, doctrine or organizational structure constrains the speed at which a new system can be fielded. The production of effective systems within the resources available and in accord with shifting priorities requires careful management and a clearly defined concept of operations.

1.4 CDC Concept of Operation.

a. The current concept of operation for accomplishing the tasks discussed above, was developed during the reorganization of CDC, approved by DA in July 1971. This concept envisions the Commanding Generals of the four developmental groups (COMS, CONFOR, INCS and PALS Groups) as "executive vice-presidents" for combat developments within broad areas of the Army in the field. In theory, these executive agents of the CG CDC, receive program guidance by means of Command Guidance Memoranda (CGM) which establish broad programs for combat developments, allocate resources for the conduct of the program, and designate a "Lead Horse" group commander to manage each program as a complete package. This Lead Horse must integrate the many separate actions within each program into a single, balanced developmental effort producing systems for the Army as described in the LCMM. Because each CGM contains actions which must be accomplished by elements of the command which are not under the control of the Lead Horse, each subordinate group commander is required to respond to requirements from more than one source. For the developmental group commanders, this presents a situation which requires careful organization: as the Lead Horse, the group

commander must balance his requirements for input from his subordinates for his own program against the requirements for input to programs managed by other Lead Horses. This balancing of effort is based on the programmed allocation of resources in the CGM's which must be maintained in line with the shifting priorities of the Army as a whole. A more detailed discussion of the CDC concept of operations is contained in Annex B of this report.

b. In order to focus attention of all managers within CDC on continued improvement of the current concept of operation, the CG CDC, has established a series of Command Management Objectives:

COMMAND MANAGEMENT OBJECTIVES
(22 DEC 71)

1. INCREASE QUALITY AND TIMELINESS OF RESPONSES TO FIELD COMMANDS AND HQ DA.
2. INCREASE CAPABILITIES FOR EVALUATION OF MATERIEL DEVELOPMENTS.
3. INCREASE CAPABILITIES FOR DEVELOPING COMBINED ARMS SOLUTIONS TO COMBAT PROBLEMS.
4. INCREASE ROLE OF MIDDLE (GROUP) MANAGEMENT.
5. REDUCE SIZE OF HQ CDC.
6. IMPROVE THE QUALITY OF PEOPLE.
7. PROVIDE ADEQUATE FACILITIES.

These objectives have been considered as part of the basic guidance used in preparing this report. In particular, increasing the capability for Test and Evaluation of materiel, reducing the size of HQ CDC, and increasing the role of middle (group) management are among the basic objectives of this SATE study.

c. Continuous, dynamic management of the combat development process is an essential part of the Lead Horse Concept, which has been developed to define the role of the Group Commander as an executive agent of the CG CDC for a particular program. Alternative definitions of the Lead Horse Concept are developed in Annex B. These alternatives are analyzed in light of their impact on the organization for Systems Analysis, and Test and Evaluation.

1.5 Constraints. Each alternative developed and analyzed in this report has been evaluated in the light of the following constraints:

a. Current Personnel Actions. In separate actions, HQ DA, has imposed a reduction of 0.5 in the average civilian grade of each element of the command, and reduction of 79 civilian personnel bringing the total number of civilian personnel down from 1226 to 1147 and an upper limit of 440 on the number of on-board civilians in the National Capitol Region (NCR) by the end of FY 72. Staff actions to implement these reductions are being coordinated with the results of this study.

b. RAC Facility Deliberations. Efforts by DA to secure the McLean, Virginia facilities of the Research Analysis Corporation (RAC) and selected RAC personnel for CDC, have not been successful to date. The DA action appears frustrated by the unwillingness of the General Services Administration (GSA) to accept the expense of leasing and operating the facility for Army use. Acquisition of the RAC facility by CDC would provide a unique opportunity for consolidation of major portions of the command. Major consolidation has not been considered as an alternative because CDC acquisition

of the RAC facility is unlikely. If the facility does become available, all alternatives should be carefully reconsidered.

c. CDC is committed in writing to the DA Staff (and personally to the Chief of Staff, Army) to complete Phase II of the reorganization of 1971. Objectives of Phase II Reorganization have not been established in writing, but the following assumptions have been adopted as constraints during the analysis by the SATE Study Group:

(1) Group CG's will manage programs assigned through CGMs. (Lead Horse Concept)

(2) Under Lead Horse Concept, HQ CDC does not need a manager to duplicate the Lead Horse functions assigned to Group.

(3) The lateral tasking of one Group by another, within workload limits established in CGMs will require a responsive mechanism at HQ CDC to resolve conflicts among requirements.

(4) HQ CDC will continue to develop Command Priority Objectives.

(5) HQ CDC will develop the definition and general outline of programs to be managed by CGM: the group assigned proponentcy for a CGM program will do the detailed CGM planning.

(6) HQ CDC will secure and allocate command resources.

(7) HQ CDC will not be involved in operations, or production of combat development products such as:

a. TOE Production.

b. Intel & Threat Analysis.

c. Planning or Conduct of Test & Evaluation.

(8) All personnel authorizations made available within the Headquarters will be transferred to the developmental Groups, once strength reductions and OTE requirements have been met.

(9) Because of high cost or critical availability, certain skills will require special management.

d. DA Need for Strong T&E Organization. The increased responsibilities in OTE recently assigned to CDC are the result of pressure from DOD and Congress on the Armed Services to increase the strength of operational test and evaluation. As the independent operational tester for the Army, CDC must develop the internal structures and procedures to insure that OTE is done effectively and given proper visibility.

e. Management Conflicts. There are conflicting regulations and procedures in several areas affecting the combat development process:

(1) The conflict over development responsibilities for automated systems for the Army in the field is being reduced by planned revisions to AR 18-1 (Army Management Information System, Objectives, Policies, Procedures, Responsibilities). The increased workload associated with proposed revisions of the regulation should not alter the relative desirability of any of the alternatives considered in this report.

(2) The division of responsibility for logistic developments between PALSG, and CONFORG or COMSG, has not been considered by the SATE Study Group. Changes in proponentcy would shift some workload, but will not alter the relative proportion of Systems Analysis support or Test and Evaluation expertise required.

(3) Air Defense proponentcy - The transfer to CONFOR of ADA would affect the distribution of Systems Analysis and Test and Evaluation resources.

1.6 Observations.

a. The current life cycle does not show clearly the development effort of CDC in the following areas:

(1) The relationship of CONAF (The Conceptual Design of the Army in the Field) to the development of doctrine, organization and materiel needs for the Army.

(2) The life cycle for development of new Army systems which are not dependent upon new materiel. (See Fig. A-2)

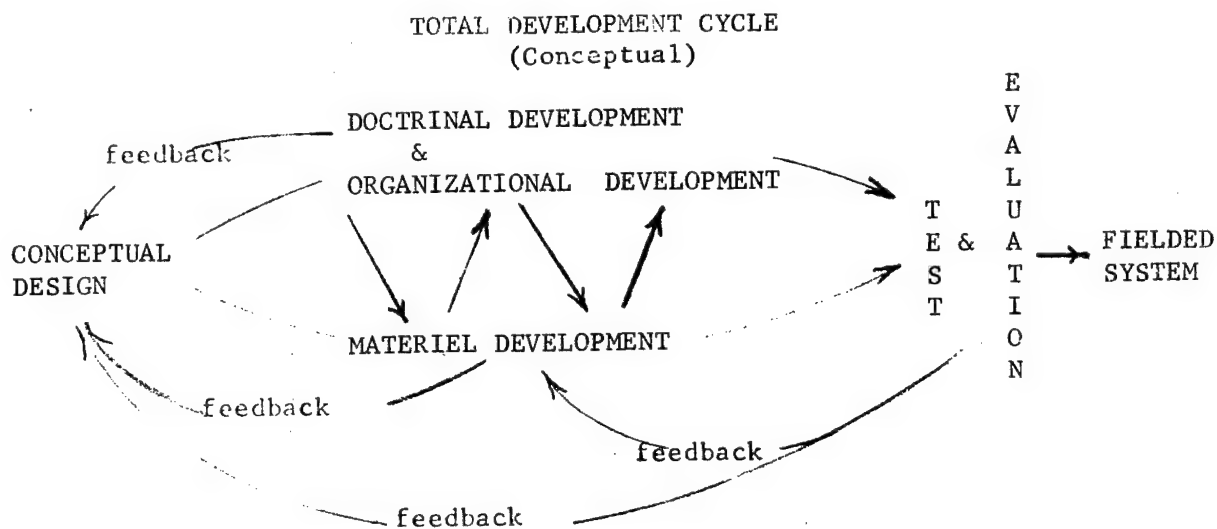


Figure A-2

b. The LCMM describes the development of a single item or materiel system, but does not describe how individual developments make cumulative changes to the capabilities and characteristics major unit systems of the Army. (See Figure A-3)

SYSTEMS INTEGRATION

(Conceptual)

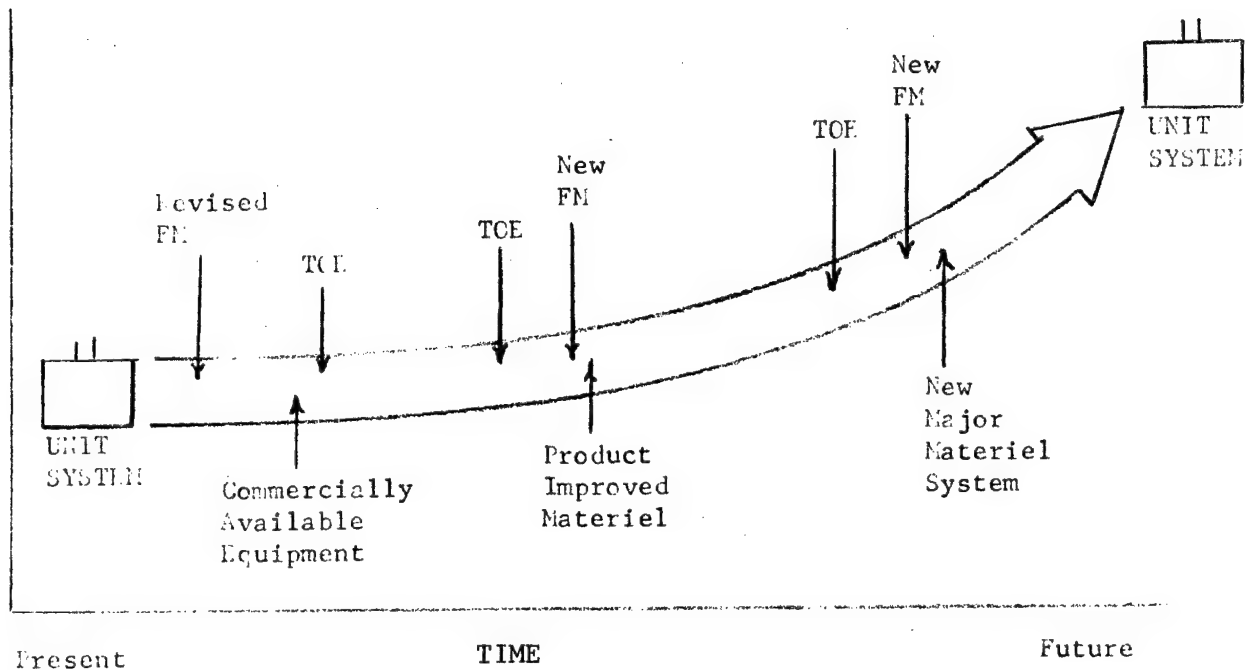


Figure A-3

c. The current LCMM is more than three years out of date. Draft revisions at HQ DA have been deferred because of higher priority projects. Until a revised DA Pam 11-25 is published, the LCMM will be of minimum value to CDC.

d. The DA action officer responsible for the LCMM has indicated a willingness to use a CDC draft revision of the LCMM to begin coordination of a revision to DA Pam 11-25.

e. The complexity of the LCMM limits the value of the model for instructional purposes.

f. Action officers need an updated model of the CDC process, based on the new organization and concept of operations.

1.7 Conclusions.

a. The LCMM should be revised to reflect the current realities systems development within the Army.

b. A simplified flow-chart of CDC life cycle responsibilities should be developed for use within CDC to show the inter-relationship of combat development products. This model should show the integration of developments into major unit systems, and the life cycle of developments not dependent upon new materiel.

c. A detailed life cycle model, describing the internal process of CDC operations, is needed for use by action officers and first line managers throughout the command.

d. Regulations assigning responsibilities to CDC must be examined for accuracy, updated as necessary and cross-referenced to a minimum number of basic regulations to reduce the duplication and conflicts in the current documents assigning missions to CDC.

Appendixes

- A-1 LCMM for Army Systems
- A-2 CD Steps in Life Cycle

Appendix A-1

The Life Cycle Management Model for Army Systems (LCMM)

1. General. The Army process for developing and fielding new items of equipment is formalized into a management model called the Army Life Cycle Management Model for Army Systems (LCMM), described in detail in DA Pamphlet 11-25. The LCMM is a management tool used as a guide in the acquisition of new components, subsystems, systems, and equipment for the Army. It provides the basic framework through which the Army determines future needs and through which new or improved equipment is defined, developed, tested and evaluated, produced, fielded and ultimately disposed of when no longer needed. It is designed to ensure that each item is fielded as a complete system to include trained personnel, logistics support, technical literature and an approved doctrine and organization for employment. The LCMM is divided into four phases, each containing precise steps and evaluation (review and decision points) to provide for orderly transition from one phase to another. A simplified flow chart of the LCMM is attached.

2. Conceptual Phase (CP) (Formerly, Concept Formulation Phase). This is the first phase in an Army system's life cycle. The technical, military and economic basis for the program, and total feasibility are established through comprehensive system studies and the development and evaluation of experimental hardware. During the Conceptual Phase, identification of critical technical and operational issues for test and evaluation are initiated. These issues for test and evaluation will be included in the SDP Summary, the CTP and the Development Concept Paper. Support system and equipment system interfaces are initially defined and first order quantified support goals and equipment functional characteristics required to meet these goals are established. Threat forecasts, technological forecasts and Joint and Army plans are examined by the combat development agencies to determine operational capabilities, doctrine and specific materiel needs that will provide Army forces with improved capabilities. This phase also includes the attainment of concept formulation objectives, Department of the Army consideration and approval for proposed materiel needs, preparation of supporting data for inclusion in the next submission of the Program Objective Memorandum (POM), and preparation of Advanced Development Plans (ADP), System Development Plans (SDP), and Development Concept Papers (DCP), as appropriate. Concept Formulation objectives will be addressed for every item/system proposed for development, although the extent and detail of the Concept Formulation Package (CFP) which results will vary according to the cost and complexity of the item/system being considered. When the Army determines that a major system/program should be pursued, a DCP will be prepared and submitted to the Milestone I DSARC for consideration. The SECDEF

will, subsequently, make a decision based in the DSARC recommendation. If approved, the program will enter the Validation Phase and will be conducted within the DCP thresholds. See AR 71-1 and AR 705-5.

3. Validation Phase. (Formerly, Contract Definition Phase) This phase consists of those steps necessary to resolve or minimize special logistics problems identified during CP, verify preliminary design and engineering, accomplish necessary planning, analyze trade-off proposals and prepare firm contracts as required for full-scale development. The validation process may be conducted by competitive or sole source contractors or by in-house laboratories. When conducted by in-house laboratories, validation will include all provisions normally required by competitive or sole source contractors except those relating to a competitive environment and a fully structured development contract. At Milestone I, decision should be made as to the desirability of constructing experimental or operational prototypes to be used during the Validation Phase in order to clarify cost, environmental impact, operational and/or technological factors and supportability to full-scale development. Projects for which contract definition is accomplished will be subjected to an IPR subsequent to source selection and prior to award of the Engineering Development (ED) contract. Results of the IPR serve as the basis for determining if the development contract is to be signed and engineering or operational system development initiated. When the Army is confident that a major program warrants full-scale development, it will request a SECDEF decision to proceed. A Milestone II DSARC will normally review program progress and suitability and forward its recommendations to SECDEF for decision. Prior to the DSARC review, the CFP and the DCP will be updated, and the MN will be reviewed to ascertain that stated requirements have been achieved. See AR 71-1 and AR 705-5.

4. Full-Scale Development. During this phase, the system, including all items necessary for its support, is fully developed and engineered, fabricated, tested, and type classified. Concurrently, non-materiel aspects required to field an integrated system are developed, refined and finalized. These include doctrinal and organizational actions such as Basis of Issue Plans (BOIP), personnel and equipment authorization documents (TOE, MTOE TDA and CTA), training and technical publications, and modifications of doctrine to include FMs and automation as required. Criteria are specified and documented in a support system or other specifications by which logistics support considerations shall impact on the design and configuration of the equipment system. If the Army believes that a major system is ready for commitment of resources to production and deployment, it will request a SECDEF decision to proceed. At that time, a Milestone III DSARC will again review system progress and forward its recommendations to the SECDEF for final decision. Prior to the DSARC, a DEVA IPR will be held to review the

MN and update the CFP and DCP to include an Economic Analysis (AR 37-13), when appropriate, in support of the proposal. The results of all operational testing must be presented to the Milestone III DSARC. See AR 71-1, 705-5, and AR 37-13.

5. Production and Deployment. During this phase, operational units are trained, equipment is procured to meet the Authorized Acquisition Objective (AAO), distributed in accordance with Major Items Distribution Plan (MIDP), and logistical support is provided. Product improvements are applied to the equipment and/or support system as required by operational experience or to exploit new technology and doctrine. Table of Organization and Equipment (TOE), Table of Distribution and Allowances (TDA), and Common Table of Allowance (CTA), are refined or modified as required. When the operational need for the system no longer exists or a new system to serve the purpose has been developed and fielded, appropriate items of materiel are type reclassified, phased out and disposed of under the provisions of AR 71-6, AR 755-1, and AR 755-2.

Potential Syst. Anal Support Rqmt	T&E Action	C O N C E P T U A L P H A S E	Task	Product
SA			Conduct designated Strategic Studies	Strategic Study
			Study Conflict Situations; identify future Army Tasks (CSAT)	CSAT Study
SA			Develop future Land Combat System	LCS Study
			Identify OCO	POCO
			Conduct study to develop basic doctrine	Doctrinal Study
SA			Prepare Initial Draft Proposed Materiel Need	IDPMN
	TE		Develop DPMN with AMC; identify critical issues; coordinate	DPMN
			Prepare PMN & Technical Plan; submit to DA	PMN
SA			Conduct CONAF iteration	CONAF Up-date
SA			Conduct special studies as required	Special Study
			Review Trade-off Determination	TOD Annex
SA			Prepare (joint with AMC) Advance Development Plan	ADP
SA			Analyze Trade-offs (with AMC)	TOA Annex
			Prepare Initial Unit Structure; Tentative Basis of Issue	IUS/TBOI
SA			Select (with AMC) Best Technical Approach	BTA Annex
			Prepare (with AMC) Preliminary System Development Plan	PSDP
SA	TE		Input to Coordinated Test Program (Revise Critical Issues)	CTP
SA			Conduct (with AMC) Cost/Operational Effectiveness Analysis	COEA

Potential	T&E
<u>Syst. Anal.</u>	<u>Action</u>
<u>Support Rqmt</u>	

Product

Prepare PMN(ED) and '5-Pack'

PMN (ED)

Proposed Program Change Required

PCR

Proposed Systems Development Plan

PSDP

Coordinated Test Program

CTP

Concept Formulation Package

CFP

Draft Development Concept Paper

DDCP

Prepare CDC position for $\left. \begin{array}{l} \text{Conceptual} \\ \text{SDP/CTP} \end{array} \right\}$ IPR

Attend Conceptual IPR

Potential ORSA Support Rqmt	T&E Action	V A L I D A T I O N P H A S E	
		<u>Task</u>	<u>Product</u>
SA	TE	Assist TECOM during Development Suitability Test Plan	Draft DST Plan
	TE	Coordinate DST Plan	
	TE	Approve DST Plan	DST Plan
	TE	Observe conduct of selected DST	
SA	TE	Prepare independent evaluation, DST report	Independent Eval, DST
SA		Conduct operational analysis of contractor trade-off	
		Recommend proposed trade-offs	
		Decide (with AMC) on proposed trade-offs	
		Develop CDC position for: { Contract Def. } IPR { Validation Phase }	
		Attend Validation IPR	
		Develop (with AMC) changes to SDP/PCR/SD/MCP/MN(ED)	Changes

F U L L S C A L E P R O D U C T I O N (I)

Potential
ORSA
Support Rqmt

T&E
Action

Task

Product

TE	Review (with AMC) CTP, Develop Evaluation Facility Requirements	Facility Rqmts
	Activate Inter-Service/Host-Tenant Aglinements	MOA
	Up-date (with AMC) SDP	Revised SDP
	Develop (with AMC) input to Master Plans; Scheduled for Development	Master Plans
	Prepare (with AMC) Master Plans; Scheduled for Development	Schedules for Dev.
SA	Review (with AMC) Program; Develop Total Maintenance Requirements.	
	Prepare (with AMC) Total Maintenance Requirements by Loc	Total Maint Rqmts
	Prepare Draft Field Manual	Draft FM
	Up-date Unit Structure, Basis of Issue	Unit Structure, BOI
SA	Assist (AMC) in Expanded Svc Test Planning	Input to EST Plan
TE	Coordinate EST Plan	
TE	Approve EST Plan	EST Plan
TE	Observe selected Engineer Design Test	
TE	Review EDT Report	
SA	Prepare CDC position for Prototype System IPR	
	Attend Prototype System Characteristics IPR	

Potential

ORSA

Support Rqmt T&E Action

F U L L S C A L E P R O D U C T I O N (I I)

Product

Task

TE Observe selected R&D Acceptance Tests

TE Observe selected Engineering Tests

TE Evaluate ET Report

TE Observe Expanded Service Tests

TE Conduct Independent Evaluation, EST Data

TE Submit Independent Report, EST Evaluation

TE Evaluate EST Report

Review Status of Development

Complete Tentative FM; Planned TOE

Input to Maintenance Support Plan; Engineer Ch. Proposal

Prepare & Coordinate Draft FM

Prepare Initial Draft Plan TOE

Prepare Tentative BOI Plan

Prepare CDC Position for Development Acceptance IPR

Attend Development Acceptance IPR

Independent Eval,
ET Report

Independent Eval,
EST

FM(T); Plan of TOE

Draft FM

IDPTOE

TBOI Plan

Potential ORSA Support Rqmt	T&E Action	FULL SCALE PRODUCTION (III)	Task	Product
		Prepare (with AMC) MN(P)		MN(P)
		Recommend (with AMC) Type Classification LP(T); LP(U); STD()		
	TE	Observe selected Pre-production Test		
	TE	Review PPT Report		Independent Review, PPT Rpt.
	TE	Observe selected Initial Production Test		
	TE	Review IPT Report		Independent Review, IPT Rpt.
		Prepare FM, 1st Edition		FM
		Prepare Final BOIP		BOIP
SA	TE	Assist (with CONARC) in ICTT Planning		Detailed Test Plan
SA	TE	Assist (with CONARC) in ICTT Conduct		
SA	TE	Assist (CONARC) in ICTT Report		ICTT Report
SA	TE	Review and Evaluate ICTT Report		
		Develop CDC position for Production Validation IPR		
		Attend Production Validation IPR		
		Prepare Plan TOE		Plan TOE
		Prepare complete BOI Plan		BOIP

Potential Syst. Anal Support Rqmt	T&E Action	PRODUCTION AND DEPLOYMENT PHASE		Product
		Task		
SA	TE	Assist (CONARC/Major overseas Command) with Troop Test Plan		Troop Test Plans
SA	TE	Assist (CONARC/Major overseas Command) with Conduct & Reporting of Troop Test		Troop Test Report
SA	TE	Evaluate Troop Test Results.		Evaluation
		Review (with AMC) MN (P) Characteristics		
		Revise TOE, FM		Revised TOE Revised FM
		Review Surveys & Reports from TOE Units		
		Recommend (with AMC) Reduction or Elimination of Equipment		

ANNEX B TO SATE STUDY GROUP REPORT

Concept of Operations

1. PURPOSE. This Chapter will review the current concept for managing Combat Developments Command, determine problem areas associated with the concept, and examine feasible alternatives for improving the current concept of operations. The Chapter will examine spirit and intent of the "Lead Horse" concept within the overall management concept.

2. BACKGROUND.

2.1 The CDC concept of operations to accomplish this mission has varied considerably since the Command was created. The variation has centered around:

a. How much emphasis should be placed on identifying new material requirements versus developing new employment concepts?

b. How far into the future should CDC plan?

c. What means would be used to integrate the total CDC combat Developments program?

d. How should CDC resources be distributed between pay-off products, like doctrinal literature, new organization proposals, or materiel requirement statements, on the one hand, and studies and field tests on the other?

2.2 In general, the CDC concept of operations has been shifting away from the use of very complex combat development plans, which extended well into the future and away from an interest in "studying" problems. Now, the emphasis is on field experimentation and on obtaining operational data from field evaluations.

2.3 The CDC concept of operations has changed with each change of Commanding General. The extent of change is outlined in Chapter 1, CDC Pam 10-3.

3. CURRENT CONCEPT OF OPERATIONS FOR FY 72.

3.1 General. The CDC concept of operations for FY 72 builds on the accumulated experience in managing combat developments:

a. It takes into consideration the new materiel acquisition procedures and test and evaluation goals which have resulted from the Blue Ribbon Panel recommendations.

b. It also implements the decision to shift more responsibility to CDC Groups. This decision was necessary because CDC Headquarters had gradually become too large and involved in running the Agencies.

3.2 Planning

a. CDC adopted an open-ended problem oriented approach to planning and programing its work for FY 72. First priority has gone to identifying those major problems of the Army in the field which can be solved by combat developments activities. Intensified management is focused on solving these problems.

b. "CDC Command Priority Objectives" (CPO) frame the broad substantive objectives for CDC combat development activities. These objectives are the Command direction on which capabilities of the Army should be improved, considering the threat, technology, and returns in increased combat effectiveness. Command Priority Objectives are established each year and revised during the year as appropriate.

c. CDC planning and programing documents will give guidance and direction on what should be done in support of the Command Priority Objectives. These documents may also address other high priority combat development activities. The basic CDC planning and programing document for each major program will be called a "Command Guidance Memorandum (CGM)." For a major program the CGM will:

- (1) Identify problems to be solved.
- (2) Indicate tasks required to address these problems.
- (3) Specify, in general terms, required and allocated resources.
- (4) Indicate critical milestones and decision points.
- (5) Address a one- to five-year planning period for CDC tasks and actions associated with the program.

d. Overall action responsibility for managing a major program is assigned to the Group with the preponderance of the action. This Group will prepare detailed task directives to implement the program. It will task other Groups as required, within the substance and resources allocated in the approved CGM. Other Groups insure that their actions satisfy requirements and milestones established by the responsible Group. When necessary, or if conflicts arise, tasking directives will be coordinated with HQCDC.

e. An additional CGM will be prepared to address CDC work not in support of a major program. The completed CGMs, when considered together with the product plans, will be the CDC Combat Developments Program. Figure B-1 is the planned schedule for development of CGMs in FY 72.

3.3 Operations

a. The general objectives of the operational procedures for combat development activities are:

- (1) To keep abreast, systematically, of combat development activities of subordinate commands, insuring that CDC resources and Command emphasis can be brought to bear when needed.
- (2) To insure enough review of completed products so they meet Command guidance and DA, AR, or other requirements and meet the quality standards for CDC products.
- (3) To provide new guidance on major programs already underway, based on new Command direction, new DA directives, findings from other actions, etc.
- (4) To develop other management, resource, and operations data desired by the Commanding General, CDC for decisions or information.

b. Significant Actions List (SAL). HQCDC will focus on the most significant actions connected with a CDC program (CGM). A Significant Actions List (SAL) will be prepared consisting of the most important CDC actions underway in support of the Command Priority Objectives and/or in response to DA and Command Group direction. Roughly 100 to 150 actions will be included at any one time. The list will also be dynamic -- actions will be added or deleted as work progresses. The Significant Actions List will serve as the CDC master priority list for use in advising DA of which actions (tasks), including DA directed tasks, are being given high CDC Command visibility and emphasis at any one time. The Significant Actions List will be prepared by HQCDC, DCSOPS, and published as an annex in each CDC program (CGM).

c. Critical Points. Decisions and operations critical points will be identified for each action on the Significant Actions List. Critical point information for a six-month period into the future will be forecasted. The data will be inserted into the USACDC ADP/MIS. It will also be used in preparing the CDC Commanding General's calendar. The type critical points of concern are those where HQCDC becomes involved, for example:

- (1) A decision by HQCDC is needed;
- (2) HQCDC may need information;
- (3) A major product is due in from the responsible CDC Command;
- (4) CDC coordination with a major non-CDC command is due; and
- (5) Coordination with the DA staff on a major product or task is scheduled.

d. Command/Operations MIS Subsystem. Significant action and critical point information will be kept current and processed using a command/operations MIS subsystem. CDC will first experimentally evaluate the feasibility and impact of an on-line management process. Results of the experiment, if successful, could lead to major changes in management procedures throughout the Army.

e. CDC Operations Center (CDOC). An operations center has been established at HQCDC. It maintains information on CDC programs (CGMs) which includes their current tasks, resources, schedules, significant actions, and critical points. It will also include visual (TV) and teletype on-line terminals to the command/operations MIS subsystem when developed.

4. RESPONSIBILITIES.

4.1 General. The concept of operations establishes three levels of responsibility:

a. HQCDC: Responsible for identifying Command Priority Objectives, preparing Command Guidance Memoranda, changing these program documents in light of day-to-day operations, and insuring the CDC Commanding General's guidance on the direction and quality of CDC work is carried through.

b. Action Proponent Group: Responsible overall for implementing the directions in the CGM and fulfilling other mission requirements.

c. Supporting Group: Responsible for carrying out tasking directives received from Action Groups.

4.2 HQCDC STAFF RESPONSIBILITIES

a. DCSOPS: Responsible overall for CDC combat developments activities within HQCDC. DCSOPS will establish procedures within the headquarters for preparing Command Guidance Memoranda and managing day-to-day operations. Principal specific HQCDC staff responsibilities are:

- (1) Developing proposed Command Priority Objectives.
- (2) Preparing planning guidance for HQCDC staff.
- (3) Preparing Command Guidance Memoranda (and changes).
- (4) Directing the preparation of functional product management documents.
- (5) Directing day-to-day HQCDC combat development staff activities to include the review of all HQCDC tasking.
- (6) Providing an analytic review of major CDC products for the Commanding General, CDC, as required.

(7) Supervising the coordination of major CDC programs with the Department of the Army and other major non-CDC commands.

b. HQ CDC Developmental Directorates. During the period of HQ CDC reorganization, the Developmental Directorates will support this concept of operations by:

(1) Identifying candidate Command Priority Objectives.

(2) Assisting in the preparation of major program CGMs. These CGMs will be prepared by DCSOPS Ad-Hoc Program Management Groups. Directorates will provide representatives on each group, and in some cases, chair the group.

(3) Acting as the staff proponent for those major actions addressed in the CGM. As staff proponent, the designated Directorate:

(a) Performs staff actions necessary to insure accomplishment of the task.

(b) Monitors progress of the task from the initiating directive through completion. Insure early identification and resolution of problem areas.

(c) Monitors supporting requirements of the action proponent with other CDC groups/institutes/agencies.

(d) Coordinates actions between the action proponent and DA and the major Army commands.

(e) Insures that DA imposed suspense dates are met on time and that adequate time is provided for staffing and coordinating completed tasks before submission to DA.

(f) Proposes changes to the CGM throughout the year as necessary.

(4) Developing significant action list and significant actions critical point information. A directorate will be assigned proponentcy for significant actions. That directorate will be responsible for preparing information or decision papers for use by the Commanding General at critical points, and for preparing briefing books for his use when he attends meetings outside CDC to discuss issues related to the action.

(5) Preparing functional product (FMs, TOE, etc.) management documents.

4.3 FY 72 Group Responsibilities.

a. General. The FY 72 concept of operations increased the substantive and management role of the CDC groups. The principal changes from the FY 71 system are outlined below.

b. Preparation of Planning Documents. HQ CDC direction on what work will be done in support of the Command Priority Objectives and other important combat development activities will be furnished to the Groups in a CGM. The group assigned action responsibility for the CGM must accomplish the following:

- (1) Convert the guidance into specific actions and a work program.
- (2) Determine resource needs to execute the work program for the planning period (normally, one fiscal year ahead), both from his own command and from supporting groups. Resource needs will be expressed as man-years. These resource requirements will be reviewed by HQ CDC in light of Command guidance, DA requirements, the requirements of other programs, and views of other group commanders on the availability of resources, etc.
- (3) Determine a schedule of work, critical points, etc.
- (4) Manage the program for the Commanding General, CDC.
- (5) Prepare quarterly progress reports on CGM major programs.
- (6) Forward completed SAL actions to HQ, CDC, for approval.
- (7) Approve all non-SAL actions for the Commanding General, CDC.
- (8) Propose changes for improving the CDC programs (CGMs).

c. Tasking of One Group by Another. All major tasking of one group by another group will be coordinated with HQ, CDC. This coordination will be accomplished as follows:

- (1) In the approval of a new CGM. The CGM will indicate substantive requirements from other groups and an estimate of needed resources to accomplish certain tasks. Once the CGM is approved, it becomes the allocation of CDC resources for the accomplishment of directed tasks. Tasking that is covered by the CGM need not be further coordinated with HQ, CDC.

(2) In the approval of a change to an existing CGM. The same reasoning described above will apply.

(3) Through a separate action with HQ, CDC, on a task basis, if the specific work requirement does not fall within the scope of an existing CGM.

5. CURRENT STATUS.

5.1 General. The Commanding General, CDC, approved the basic concept of operations on 30 March 71 for implementation in FY 72. The basic document describing the concept of operations was published as CDC Pam 10-3 on 15 June 71. Each group of CDC was briefed on the substance and content of the concept prior to the publication of the Pamphlet. To date, approximately 1500 copies of the Pamphlet have been distributed within the Command. The current stock has been depleted but further printing has been delayed pending the incorporation of revisions to bring the Pamphlet up to-date. Although the concept Pamphlet has received wide distribution, visits to the Groups in January 72, indicate that the concept is generally not understood and few actions have been undertaken by the Groups to fully implement the provisions of the "Lead Horse" concept which is embodied in the overall concept. Retention of the "business as usual" large HQ CDC, coupled with lack of resources at the group level, are the prime contributors to the ineffective execution of the concept.

5.2 CDC Programs. Figure B1 contains the status of the 16 Programs currently identified for development into Command Guidance Memoranda (CGMs). Only six programs have been approved to date. This represents about 50% of the initial goal set in June 71. The short fall in program development has largely been attributed to the shortage of DCSOPS personnel to coordinate the actions associated with each CGM. The personnel situation was corrected in November 71, which will enable the completion of the basic programming by April 72. The result, however, is that the new concept of operations will not be effectively implemented until FY 73.

5.3 CDC Significant Actions List (SAL). The initial CDC SAL list was developed in July 71, based on a subjective review of each of the 1700 active actions against the CDC Pam 10-3 criteria and the Command Priority Objectives (CPO). The SAL list has been modified when each CGM is published and also based on experience gained in identification and tracking on the actions of particular interest to the Commanding General. The initial drive to inflate the number of SAL actions has been tempered by experience gained in having the CDC Command Group involved in the details of the action; especially, when a milestone was missed. The concept for having the CDC HQ review and approve only SAL actions has not been

CDC PROGRAM

<u>Number</u>	<u>Title CDC Program</u>	<u>Publication Date</u>	<u>CDC HQ Program Action Officer</u>
1-72	Integrated Battlefield Control System	15 Jul 71	LTC Williams
2-72	Intelligence/STANO	30 Aug 71	LTC Blanche
3-72	Tank/Antitank	23 Dec 71	LTC Ashworth
4-72	Communications-Electronics	17 Nov 71	MAJ Ramos
5-72	Airmobility/Airspace Operations	23 Dec 71	LTC Stewart
6-72	Civil Emergency/Disturbance Operations	17 Nov 71	LTC Roberts
7-72	Logistics	Apr 72	MAJ Ramos
8-72	Tactical Nuclear Warfare	May 72	LTC Roberts
9-72	Stability Operations	Mar 72	LTC Roberts
10-72	Air Defense	Mar 72	LTC Williams
11-72	Strategic Mobility	May 72	LTC Stewart
12-72	Personnel Systems	May 72	MAJ Ramos
13-72	Electronic Warfare	May 72	LTC Blanche
14-72	Force Design	Apr 72	LTC Ashworth
15-72	Anti-Personnel/Anti-Materiel Battle Systems	Apr 72	LTC Ashworth
16-72	Ground Mobility	May 72	MAJ Ramos

Figure B-1

implemented, primarily because HQ CDC still has the manpower to involve itself in each of the 1700 active actions. As a result, the groups have not exercised, to any degree, the authority contained in Section 7 of each CGM dealing with the approval of non-SAL actions by the CG of the Action Group.

5.4 Management Information Systems (MIS). The MIS in being in HQ CDC prior to the implementation of the current concept of operations was inaccurate and ineffective as a tool for managing the activities within the Command. Thus, the principal managers within the Headquarters did not use the MIS as an integral part of their management operations. The current concept of operations called for an immediate upgrading of the current system and the development of an experimental MIS system to improve the effectiveness while reducing the overhead connected with CDC management (currently, 5% of the total personnel in the Command). DCSOPS sponsored the initial upgrading of the MIS and the development of an experimental system. FY 71 funds were identified to support the experimental system but the request was not processed prior to 30 June 71. Thus, the funds were lost and no FY 72 funds have become available to support the project. DCSOPS has continued to look for low cost systems but, thus far, has only been able to get the telecopiers installed between the CDOC and the groups. This small low cost off-the-shelf innovation has speeded up the flow of information within the Command. The current "on-board" MIS is undergoing revision in order to make it useful as a tool for management. The primary difficulty is to convince managers (commanders and staff officers) on the potential utility of the current system. Most responsible personnel within the Command are convinced that the current system has no value, but few senior personnel have devoted personal attention to the overhaul of the MIS. The Armor Agency continues to lead in the innovative use of the MIS in management. In general, however, the technicians continue to design the MIS and until the command level gets involved in the design of the MIS, the MIS will continue to be considered a repository of mis - and historical information.

5.5 Combat Development Operations Center (CDOC). Initial work on the CDOC began in Jul 71. Field visits were made to AMC, CONARC, MASSTER, AVSCOM, and the Army Operations Center to view the ways command management centers are organized and operate. The initial CDOC efforts were unsuccessful despite the large staff effort involved, the primary difficulty with the initial CDOC was that it was designed to display data under the old management concept resulting in the display of large amounts of data with little or no relationship between one bit of information and another. The CG was not aided by the CDOC, therefore, it was redirected to display data in accordance with CDC Pam 10-3. Current efforts are now directed to the display of program management information. The man-month cost of the CDOC is very high. Unless the Command Group uses the CDOC as an essential tool

for management, current efforts should be suspended and work redirected toward obtaining a simple MIS that could have output devices installed in each management office within the Headquarters and subordinate commands of CDC.

5.6 "Lead Horses." To date, lead horses have been established for the six CDC programs (CGMS) that have been approved and published. INCS Group is in the best posture since it has an approved program for each of its major areas of responsibility. PALS and CONFOR have no approved programs and COMS has three of the eight programs that it will eventually receive. The problem with program implementation centers around HQ CDC. The concept of operations envisioned a smaller HQ CDC structured to manage the SAL actions. With few exceptions, HQ CDC still continues to do business as usual with the results that the groups have been reluctant to revamp their operation even though they have expanded responsibilities and authorities. The groups have not received any resources to assist them in executing their expanded management responsibilities. The lack of dynamic program management systems within the groups indicates that CDC in effect has undergone little change in the way it conducts its business. In order to achieve the initial goals of the current concept of operations and the associated "Lead Horse" concept, focus must be placed on the following areas.

- a. Expedite the completion of the basic 15-20 CDC programs.
- b. Reduce the size of HQ CDC and apply the resources to the groups.
- c. Restructure the Group HQs along a program management basis to give the "Lead Horses" the management tools to carry out their responsibilities.

6. CONSIDERATION OF ALTERNATIVES.

6.1 General. During the reorganization of CDC in FY 71, three basic alternatives were considered, the weak lead horse, the medium lead horse, and the strong lead horse. The basic philosophy for each alternative is outlined below:

a. Weak Lead Horse. Under this alternative, the lead horse would command the agencies assigned and would be responsible for carrying out actions as directed by HQ CDC. All completed actions would be forwarded to HQ CDC for review and approval. HQ CDC would carry out most of the intercommand coordination associated with a particular action. Program management would be carried out at HQ CDC. This alternative was associated with the management concept of CDC prior to FY 71.

b. Medium Lead Horse. Under this alternative, HQ CDC would be reduced to a size necessary to manage the key actions known as SALs and

the remainder of CDC actions (over 90%) would be delegated to the groups. The groups would take on added responsibilities and authorities along with increased resources necessary to carry out their expanded functions. The Lead Horse would be the primary CDC representative of all actions other than the SAL. This alternative was selected as the goal for the current concept of operations.

c. Strong Lead Horse. Under this alternative, the Lead Horse become a Deputy CG, CDC, for his area of interest in addition to his role as a group commander. The group and HQ CDC staff would be merged thus eliminating one echelon of staff. The residual HQ CDC would consist of the DCSMAR and a DCSOPS which would be oriented on integrating the activities of the groups. This alternative was considered to be the desired alternative provided the group HQs can be moved into Washington. Since the locational problem could not be solved in FY 71, the strong lead horse alternative was not selected.

6.2 Advantages and Disadvantages of the Alternatives.

a. General. This section examines each of the alternatives based on the factors present today in CDC.

b. Weak Lead Horse.

(1) Advantages

- (a) Requires no revision in current practices.
- (b) Does not require relocation in personnel resources.

(2) Disadvantages

- (a) Does not achieve management goals set in Apr 71.
- (b) Continues the heavy CDC of staff to production ratio.
- (c) Does not make full use of the General Officer talents available to CDC.
- (d) Makes ineffective use of middle managers.

c. Medium Lead Horse

(1) Advantages

- (a) Reduces the staff to production ratio.

- (b) Enables HQ CDC to focus on the key passing actions.
- (c) Exploits the General Officers talents assigned to CDC.
- (d) Shortens the response time for most CDC actions.
- (e) Achieves current management goals.
- (f) Enables the Command to absorb known personnel cuts in HQ CDC with no impact on CDC production elements.

(2) Disadvantages

- (a) Requires a major redirection of current management practices.
- (b) Requires movement of spaces and focus from the HQ to the groups.
- (c) Requires external commands to deal directly with a number of subordinates as opposed to a single HQ CDC.
- (d) Retains three echelons of management within CDC.

d. Strong Lead Horse

(1) Advantages

- (a) Eliminates one echelon of management within CDC.
- (b) Increases the authorities of the Lead Horse.
- (c) Increases the production to staff ratio within the command.
- (d) Centralizes CDC in the Washington Area.

(2) Disadvantages

- (a) Requires COMS Group to move to Washington.
- (b) Requires major organizational changes.

7. CONCLUSIONS

7.1 Although the official policy of CDC has been the medium "Lead Horse" concept, CDC, today, remains in the "weak lead" horse configuration.

7.2 The key to any change in the current status is personnel resources.

7.3 The earliest date that CDC can achieve its April 71 goals is 1 July 1972.

7.4 CDC must move towards the medium "lead horse" if economies are to be gained from the FY 71 reorganization.

7.5 The CDC concept of operations must be understood by all members of the CDC team, if we hope to gain any benefits at each level of command.

7.6 CDC publications (Regs, Pams, etc.) must be revamped to fully reflect the CDC concept of operations in every aspect of endeavors.

7.7 The strong "lead horse" can be considered a feasible alternative and it certainly offers the most gain. The key to this alternative is the move of COMS HQ to Fort Belvoir. Current policies concerning additions to the National Capitol Region (NCR) preclude the move of COMS to the NCR.

7.8 Current program management system is only in the embryo stage of development.

7.9 Resolution must be made on the assignment of the program management function in CDC, either at HQ, CDC (Weak Lead Horse), or Group Level (Medium Lead Horse).

ANNEX C TO SATE STUDY GROUP REPORT

OPERATIONS RESEARCH/SYSTEMS ANALYSIS (OR/SA)

1. THE ROLE OF OPERATIONS RESEARCH/SYSTEMS ANALYSIS IN THE COMBAT DEVELOPMENT PROCESS.

a. The Combat Development Process is described in general terms in USACDC Pamphlet 10-3, 11 August 1971, Concept of Operations for Managing USACDC Combat Development Activities, FY 72. A more specific description of a part of this process is contained in the Department of the Army Life Cycle Management Model (LCMM), AR 11-25.

b. Operations Research has been defined in many ways and by many authorities in the operations research/systems analysis field. Following are two examples of such definitions.

(1) The USACDC Methodology Notebook for Action Officers, May 1967, contains the following definitions in Chapter I, paragraph 3b:

"Definitions of Operations Research. There are many definitions of operations research (OR). Some are quite formal and say in essence that OR is a scientific method for providing decision-makers with a quantitative basis for decisions regarding operations under their control. Another meaningful definition states that OR in the most general sense can be characterized as the application of scientific methods, techniques, and tools to problems involving the operations of systems so as to provide those in control of the operations with optimum solutions to the problems. A less formal but equally good definition of OR calls it the art of giving objective, statistically reliable solutions to problems that otherwise would be solved subjectively. By any of these definitions,

OR is not a magic formula that yields a final solution to any problem; it merely claims to provide, by means of that form of logical process we call the scientific method, a rationale basis for the commander's decision. Its aim is to provide information which can improve action. For purposes of this notebook, OR is defined as the application of scientific methods, techniques, and tools to the solution of operational problems. The objective of OR is to provide the decision maker with a logical basis for making sound predictions and decisions."

(2) Russell Ackoff, an authority in the field of Operations Research, in his book, A Manager's Guide to Operations Research, does not give a definition of Operations Research but describes it in terms of essential characteristics.

"The essential characteristics of OR. The three essential characteristics of OR were identified. But now we should like to pull them out and spotlight them. They are (1) systems orientation, (2) the use of interdisciplinary (or mixed) teams, and (3) the adaptation of scientific method."

(3) To further increase the understanding of operations research, the following paragraphs describe either techniques commonly accepted as a part of OR methods or the form and content of problems which lend themselves to solution by OR methods.

(a) The CDC Methodology Notebook, Chapter I, paragraph 10, includes the following:

"10. Available Techniques. Techniques and procedures used in the solution of problems by operations research methods are shown below. For a given problem, the operations analyst can select any of these or any combination:

- | | |
|--------------------------|--------------------------------|
| a. Analytic Modeling | e. Troop Testing |
| b. Simulation | f. Cost/Effectiveness Analysis |
| c. Research Gaming | g. Human Factors Analysis |
| d. Field Experimentation | |

(b) Ackoff in "A Manager's Guide to OR", classifies problems into general categories.

"Forms of problems. There is no unique classification of the set of problems which arise in OR but for each type of classification which we use it will be seen that problems repeat themselves, the same type of problem arising in many diverse industries. Consequently, we put forward the following eight basic forms, which singly or in combination account for most of the problems that confront executives, not because they are the only useful classification but because they are forms which for our present purposes in this particular book and for the particular audience at whom we are aiming this book, are, we feel, the most useful. The classification of problems is:

- | | |
|---------------|----------------|
| 1. Inventory | 5. Routing |
| 2. Allocation | 6. Replacement |
| 3. Queuing | 7. Competition |
| 4. Sequencing | 8. Search |

Each form is a theme on which a number of variations can be played."

c. Operations Research/Systems Analysis (OR/SA) has been used in the combat developments process since the 1950's when the Army first designated an organizational element in the Continental Army Command to be responsible for combat developments.

(1) This OR/SA support was provided until the late 1960's by contract support from a variety of sources including Johns Hopkins Operations Research Office, Technical Operations Incorporated (Combat Operations Research Group (CORG)), Booz Allen Applied Research, and other contractors. The Combat Developments Experimentation Command (CDEC) has traditionally had its own scientific support office provided by contractors such as Stanford Research Institute, Litton Industries, and now Braddock, Dunn, and MacDonald.

(2) In the late 1960's USACDC organized the Institute of Systems Analysis (ISA) with the objective of providing an in-house operations research capability to USACDC. ISA has since been redesignated as the Systems Analysis Group (SA

Group) and it now has a capability of some 105 professional man-years of effort.

This total effort was made possible by the consolidation of most of the command's civilian Operations Research Analysts (GS 1515 series) under SA Group. Decision to consolidate civilian OR analysts under one command was based on (1) the desire to improve utilization of OR/SA capability and (2) to make possible the application of scarce personnel resources on mainstream problems of the command. These objectives have been realized.

(3) The CDC Contract Study Program (Ref 15) lists combat development projects which depend on outside contract support for completion.

(4) The total OR/SA requirement of USACDC represented by OR/SA capability of SA Group, plus requirements included in the Contract Study Program, plus scientific support provided to CDEC equates to over 400 man-years of effort per year (Figure 1).

(5) Specific steps in the Life Cycle Management Model have been identified as events in the materiel development process where OR/SA support should be used to assist in problem identification, evaluation of trade-offs, alternatives, and possible decisions. See Annex A of this report.

2. ASSUMPTIONS.

a. OR/SA support can be provided by either in-house capabilities or outside contractor. However, USACDC and the Army has embarked on a program to increase the in-house capability to provide essential OR/SA support. This trend will continue considering Congress' current efforts to phase out captive "think tanks" such as RAC.

b. RDTE funds for contract OR/SA support of combat developments projects will be limited.

c. USACDC Groups will continue to have the capability to authorize and utilize scientifically and technically qualified personnel in their TDA's such as scientific advisors, prefix H and MOS 8700 military personnel, and appropriate scientific and technical personnel related to their mission areas.

APPROXIMATE TOTAL USACDC OR/SA SUPPORT REQUIREMENTS
FY72

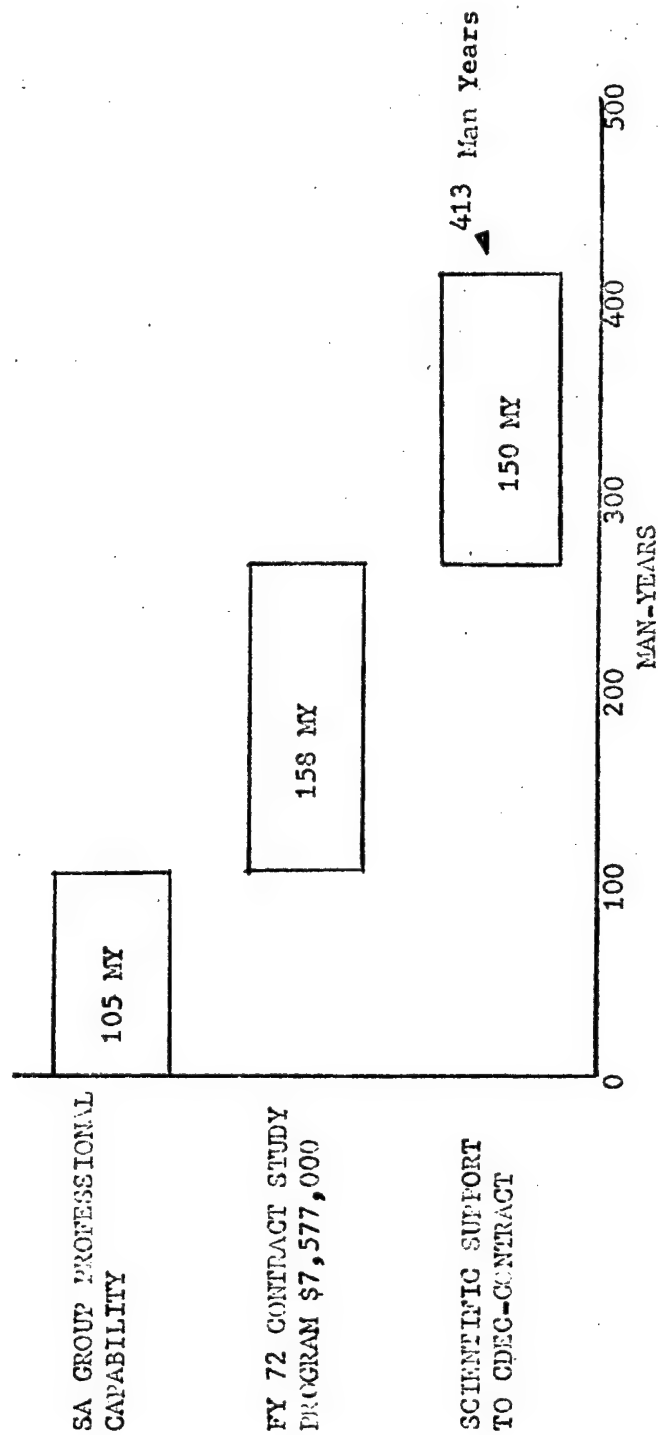


Figure 1

3. CURRENT RESOURCES - IN-HOUSE AND OUT-OF-HOUSE.

a. The USACDC has the following personnel resources to satisfy its OR/SA requirements.

(1) The SA Group has available about 105 man-years of professional effort available to apply to OR/SA support of USACDC projects as tasked by Headquarters, CDC. These personnel are qualified as Operations Research Analysts, Mathematicians, Statisticians, Engineers, Physicists, Economists, and other related disciplines. A summary of the skills available as represented by academic degrees is shown at Figure 2.

(2) USACDC has the following scientific technical resources available in the HQ, USACDC, and subordinate commands other than SA Group. These figures are derived from latest TDA's. See Figure 2a.

	<u>OR/SA Prefix H</u>	<u>OR/SA MOS 8700</u>	<u>OR/SA Civ</u>	<u>Sc Adv.</u>	<u>War Gamers</u>
HQ USACDC*	7	6	16	2	-
CONFORG & Agcys	13	5**	0***	3	11 (1- Off (MOS 8700) 8- Off (non-MOS 8700) 2- Civ - Gamers)
INCSG & Agcys	13	7	-	1	-
COMSG & Agcys	30	14	2	10	1 (7 - Military in trng)
PALSG & Agcys	1	4	2	3	-
CDEC	-	19	-	1	-
TOTALS	64	55	20	20	12

(3) SA Group has authorized 19 MOS 8700 officers and 82 professional scientific civilians.

* Does not include 1 LnO space (Opns Res Anal).

** Includes 1 Officer used as War Gamer.

*** No GS-1515 Operations Research Analysts are authorized to CONFORG HQ or its agencies. Civilian scientific capability authorized to CONFORG is shown at Figure 3.

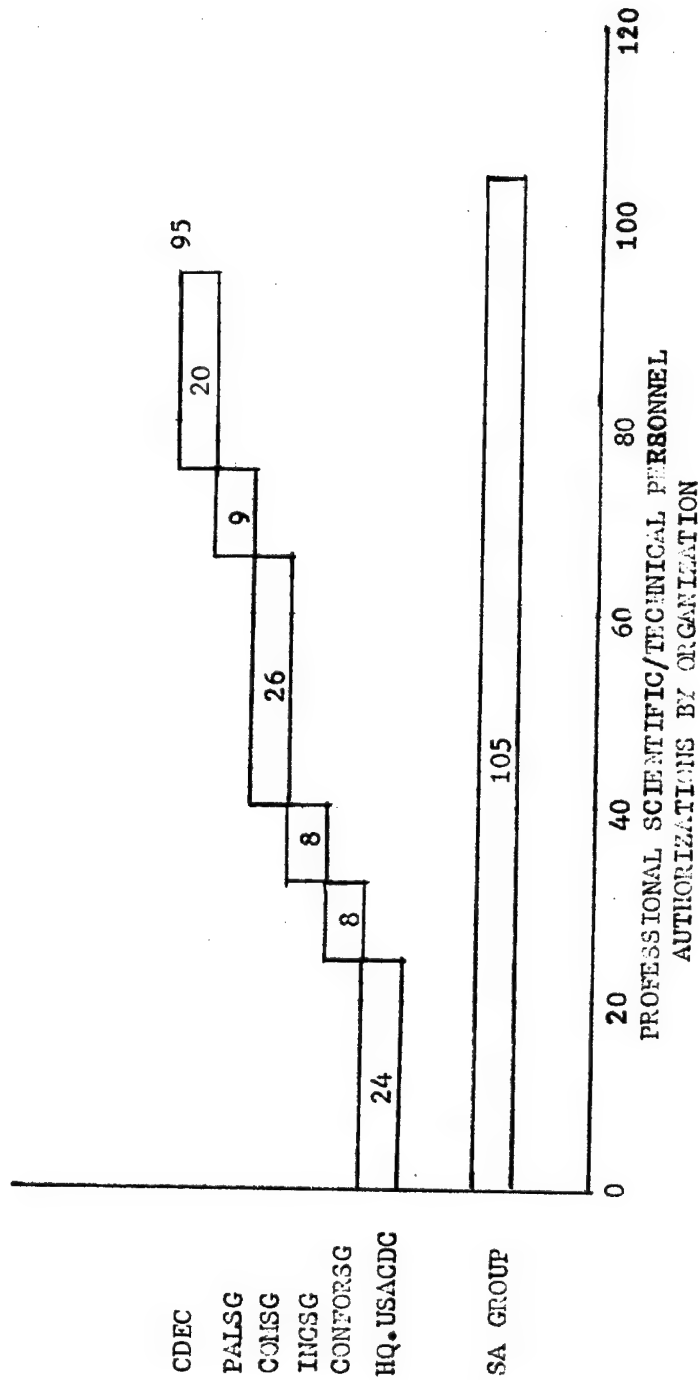
PERSONNEL SKILLS

SA Group, as of 13 Dec 71, had the following personnel skills, based on academic degrees only. This does not consider the areas of practical experience of personnel.

DISCIPLINE	DEGREES HELD		
	Bachelor	Master	Doctorate
Accounting	1		
Business Admin	5	3	
Chemistry	4		
Computer Science	1		
Economics	7	1	
Education	2	1	
Engineering, Admin	1		
Engineering, Civil	6	1	
Engineering, Chemical	2	2	
Engineering, Diesel	1		
Engineering, Electrical	4	1	
Engineering, Highway		1	
Engineering, Industrial	3	1	
Engineering, Mechanical	3	5	
Engineering, Mining	1		
Engineering, Nuclear		1	
English		1	
Geography	1	1	
Geology	4		
Industrial Management	1		
International Affairs		1	
Journalism		1	
Law	1		2
Management	1	1	
Mathematics	28	8	
Military Science(Military Academy)	14		
Operations Research	7	2	
Philosophy			1
Physics	10		
Public Administration		3	
Psychology	3	1	
Statistics	3	6	1
Structural Dynamics		1	
Science (General)			1

FIGURE 2

IN-HOUSE PROFESSIONAL SCIENTIFIC/TECHNICAL PERSONNEL
 AUTHORIZATIONS BY ORGANIZATION
 (Includes only MOS 3700 Military, OR/SA (Qualified
 Civilians, and Scientific Advisors).



DOES NOT INCLUDE In-House War Game players or Profix H Military

Figure 2a

CIVILIAN SCIENTIFIC SKILLS AUTHORIZED TO CONFORG

HQ CONFORG

TDA CDW0T ZAA 05

Date 710930

<u>Par</u>	<u>Line</u>	<u>Description</u>	<u>Grade</u>	<u>MOS</u>	<u>Br</u>	<u>Reqd</u>	<u>Auth</u>
01	03	Scientific Advisor <u>Dir of Eval.</u>	PL	1301	ST	1	1
05A	01	Chief Analysis Div.	15	1301	GS	1	1
	05	Mathematician	14	1520	GS	2	1
	06	Statistician	14	1530	GS	1	1
	07	Physical Scientist <u>Control Team</u>	13	1301	GS	1	1
05D	04	Physical Scientist <u>Materiel Rqmt Div.</u>	14	1301	GS	2	2
07A	07	Physical Scientist	14	1301	GS	1	1
	08	Industrial Engineer <u>Materiel Concepts Div.</u>	14	0896	GS	1	1
07B	01	Chief	15	1301	GS	1	1
	07	Physical Scientist	14	1301	GS	1	1
	09	Physicist	14	1310	GS	1	0

NUCLEAR AGENCY

TDA CD WOH0AA-04, 17 Nov 70

01	04	Scientific Advisor	15	1301	GS	1	1
04	07	Mathematician	13	1520	GS	1	0
	08	Ass't Mathematician	09	1529	GS	1	1

SPECIAL OPERATIONS AGENCY

TDA CD-W240AA-04, 27 Aug 71

01	04	Scientific Advisor	15	0101	GS	1	1
04	03	Electrical Engineer	14	0855	GS	1	1

Figure 3

C-8.1

(4) The USACDC has \$7,577,000 in its FY 72 Contract Study Program to apply to contractor support. The exact number of man-months of effort which can be purchased with these funds depends on many variables such as selected contractor, whether or not facilities support is provided to the contractor (as is the case at Fort Leavenworth), and whether or not computer rental is included in the scope of the contract. Using \$4,000 as an average cost per technical man-month of effort, it is estimated that the Contract Study Program will support about 158 technical man-years of effort. Part of this contract money is used to support the Computer Sciences Corporation contract at Fort Leavenworth which provides approximately 30 man-years of effort in support of the COMS Group War Game.

(5) The USACDC has a scientific support contract funded from OMA appropriation to support CDEC experimentation. Level of effort of this contract effort approximates 150 technical man-years annually.

(6) In each contract effort, the types of skills needed to address the scope of work described in the contract are determined by the sponsor and the contracting officer.

b. War Game Facilities.

(1) CONFORS Group has a war game facility at its location at the Hoffman Bldg., Alexandria, Va. It has the capability of playing one closed game with a Control Group, a Blue Force and a Red Force. The facility includes three game rooms with separate glass screens and projection facilities. It also includes a separate photographic facility. The game is supported by RAC personnel, models, and computer. Nine military officers and 2 civilians are used as game players.

(2) COMSG has a war game facility at Fort Leavenworth, Kansas which is about twice the size of the CONFORS game. It can theoretically play two closed games simultaneously. It includes six player rooms with separate screens and projection

facilities. It also includes a photographic facility. The game is entirely supported by contractor personnel from Computer Sciences Corporation (CSC) which is now using about 30 people to operate and support the game. The War Game used about 2000 hours of computer time in a 12-month period on the Control Data Corporation 3300 computer at Fort Leavenworth.

4. CURRENT EMPLOYMENT OF RESOURCES (FY 72)

a. Personnel:

(1) SA Group resources are being employed as shown on Figure 4. This projection is by Significant Action List Priority Grouping.

(2) Figure 5 shows a breakdown of the same SA Group capability by supported organization.

(3) Figure 6 shows a breakdown of the FY 72 Contract Study Program by major subordinate proponent or sponsor of the contract effort.

(4) Figure 7 shows a breakdown of the Contract Study Program FY 72 by contractor.

b. Facilities:

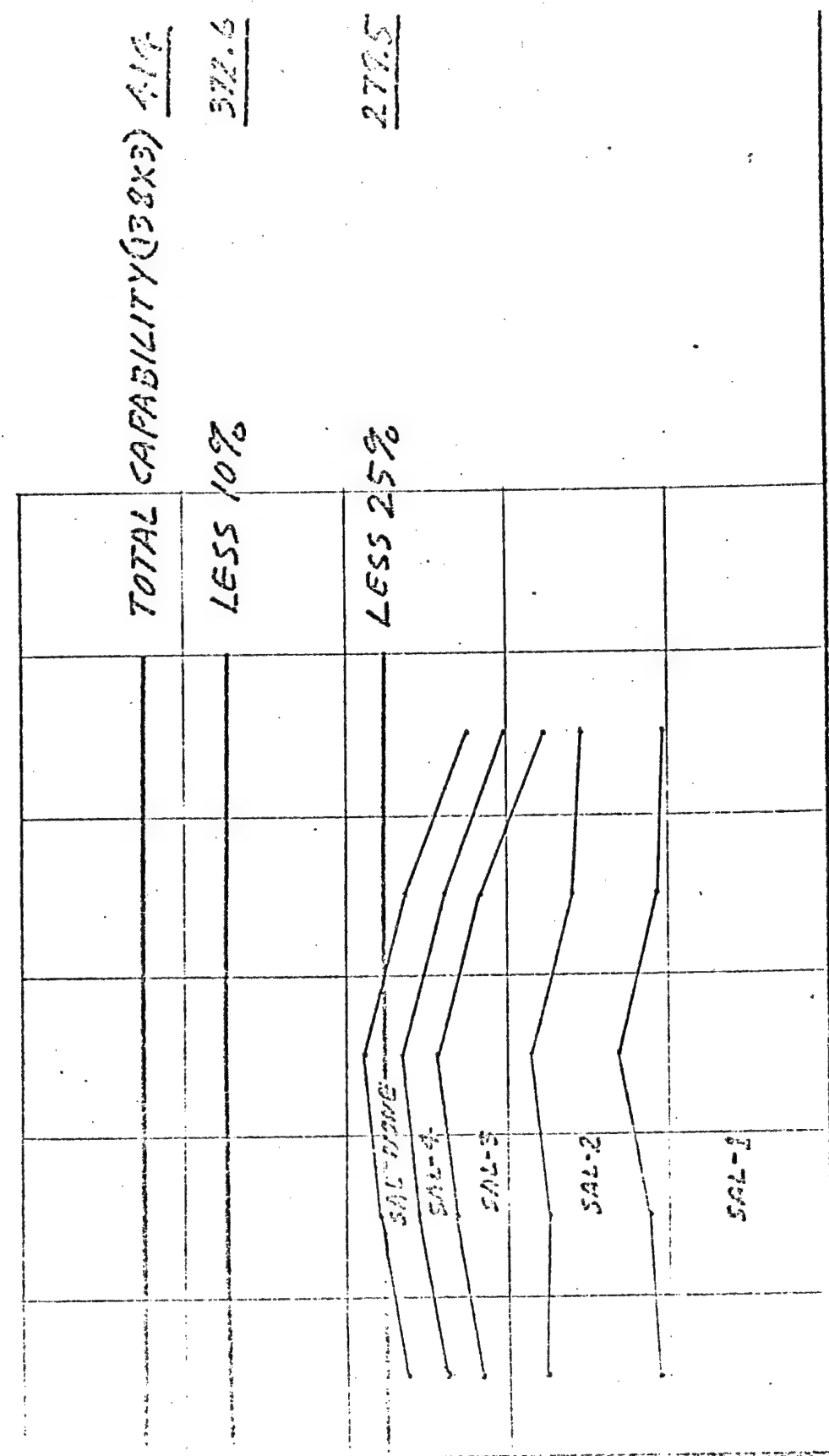
CDC has two War Gaming facilities:

(1) The CONFORSG war game in the Hoffman Bldg. , Alexandria, Va. , is dedicated to comparative evaluation of LCS I. This game is supported by both CONFORSG personnel and RAC contract personnel.

(2) The other war game facility is located at COMSG at Fort Leavenworth, Kansas. This facility is larger and is capable of running two closed games simultaneously. This game has been dedicated to the design and development of the DIVWAG game. The game is scheduled for contractor demonstration in April 72 and has not yet been used. It is scheduled to be used to evaluate TRICAP in April 1972. However, no base case is available against which to compare the results. This game is entirely contractor operated and supported. Reprogramming will be necessary to support the game on the new computer scheduled to be available

SYSTEMS ANALYSIS GROUP MANPOWER PROJECTIONS BY SAL PRIORITY

PROJECTED EMPLOYMENT OF SA GROUP PROFESSIONAL FUS UFGES



722 723 724 731 732

FISCAL QUARTERS

Figure 4
C-11

~~FOR OFFICIAL USE ONLY~~

SYSTEMS ANALYSIS GROUP APPLICATION OF CAPABILITY
BY PROPONENT

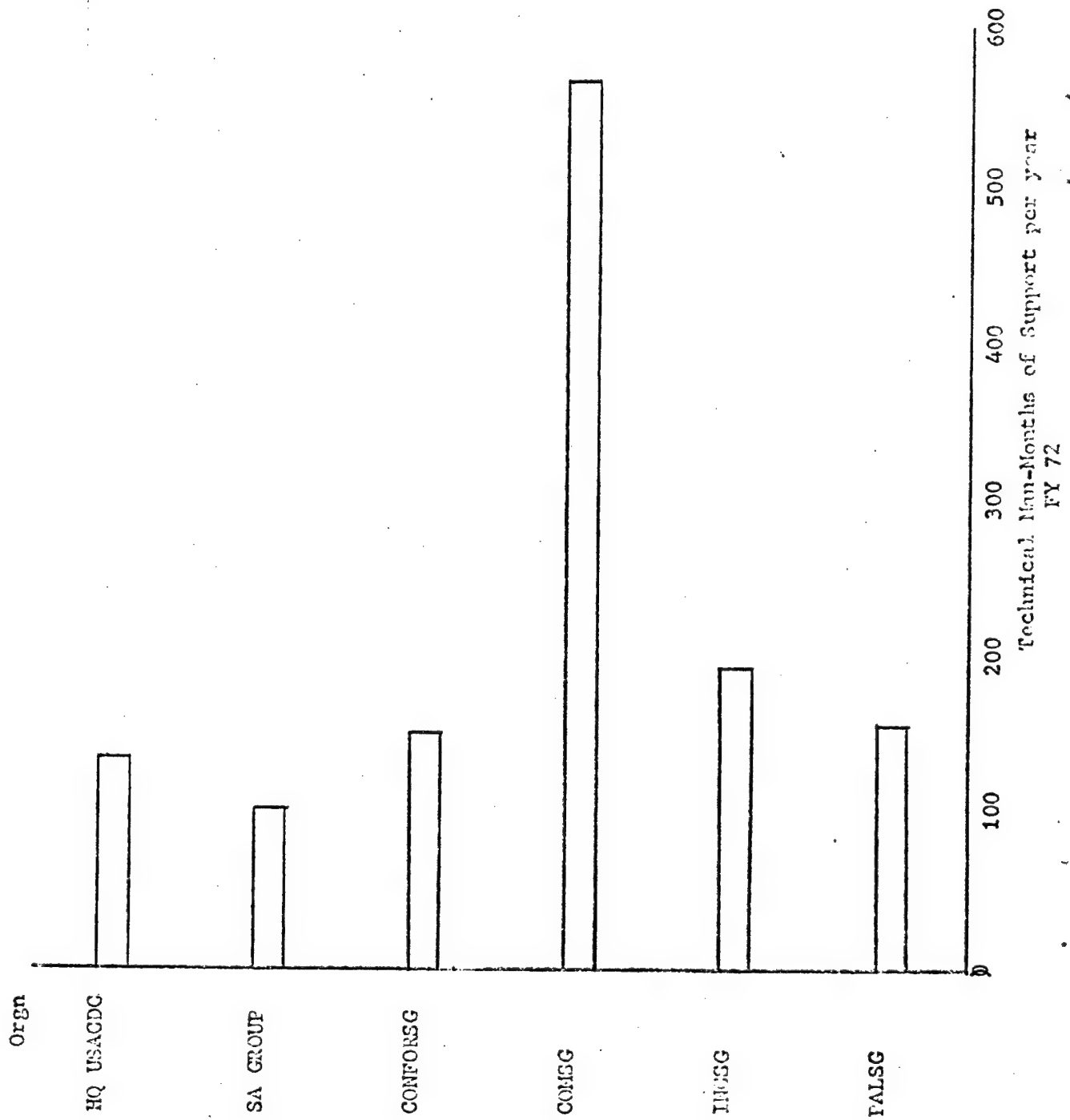


Figure 5

CONTRACT STUDY PROGRAM FY 72
(Thousands of Dollars)
By Proponent

<u>PROPONENT</u>	<u>70</u>	<u>71</u>	<u>72</u>	<u>73</u>	<u>74</u>	<u>Total</u>
HQ CDC		178	734	200		1,112
SSI		160	160			320
SA GROUP	565	265	1,081			1,911
CONFORS		628	937	500		2,065
COMSG		538	2,103			2,641
INCSG			1,907	750	840	3,497
PALS		147	655	630		1,432
	<u>565</u>	<u>1,916</u>	<u>7,577</u>	<u>2,080</u>	<u>840</u>	<u>12,978</u>

Figure 6
C-13

CONTRACT STUDY PROGRAM FY 72
(Thousands of Dollars)
By Contractor

<u>CONTRACTOR</u>	<u>70</u>	<u>71</u>	<u>72</u>	<u>73</u>	<u>74</u>	<u>Total</u>
Consultants			142			142
Inter-Army OCE			161			161
Computer Time (AFTAC/HEW)	30		50			80
CAL	535					535
Raytheon			244			244
Litton			70			70
Inter-Army BRL			15			15
CSC		598	1,644	125		2,367
RAC		1,053	1,588	500		3,141
Varied (MIP)		265	246			511
Unknown			3,417	1,455	840	5,712
	<u>565</u>	<u>1,916</u>	<u>7,577</u>	<u>2,080</u>	<u>840</u>	<u>12,978</u>

The Contract Study Program for FY 72 is \$7,577,000. This program does not contain for each project the man-months of effort. Using an average of \$4,000 per man-month, this annual contract effort approximates 158 Technical Man-Years.

Therefore, the total CDC requirement for OR/SA support/ is the sum of the SA Group professional capability and the Technical Man-Years represented by the Contract Study Program:

Technical Man-Years

	SA Group	92
	Contract Study Program	<u>158</u>
Total	CDC OR/SA Requirement	250

5. COMPARISON OF RESOURCES VERSUS EMPLOYMENT

a. Figure 8 shows actual SA Group personnel applied to Mission and Mission Support activities. 266 man months during the 1st quarter FY 72 was planned for mission effort.

Actually in the first quarter of FY 72, 291 man months per quarter was applied against mission effort. This excess of actual over planned is due to two

factors:

(1) SA Group has a very austere administrative support capability and the ratio of professional production capability to administrative support is high compared to other CDC organizations.

(2) Overtime spent on mission projects is included in the actual time reported.

(3) The breakdown of these resources against Significant Action List Priority Groups is shown at Figure 4.

(4) The application of SA Group effort against specific projects is in accordance with tasking from HQ USACDC which considers overall CDC requirements and priorities.

b. The same criteria cannot be applied to the in-house OR/SA resources of other CDC organizations since they are fragmented and a total actual figure including administrative support cannot be determined. If we consider only the MOS 8700 military, the civilian ORAs, and the scientific advisors, (the fully qualified scientific/technical personnel) the total is 95. Allowing 10% for leave and absence, the figure is then reduced to 85. The man-year capability of 85 represents a total scientific/technical capability available in-house to CDC in addition to the SA Group capability. There is no way of determining the utilization of these people or their contribution to the total CDC OR/SA requirement. Most Group commanders do not admit to having any OR/SA capability. Therefore, the assumption is made that a very small portion of the 85 man-years available is used on OR/SA requirements but is used in other productive command efforts.

SYSTEMS ANALYSIS GROUP ACTUAL STRENGTH VS ACTUAL EXPENDITURES TOTAL EFFORT

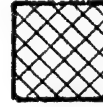
LEGEND

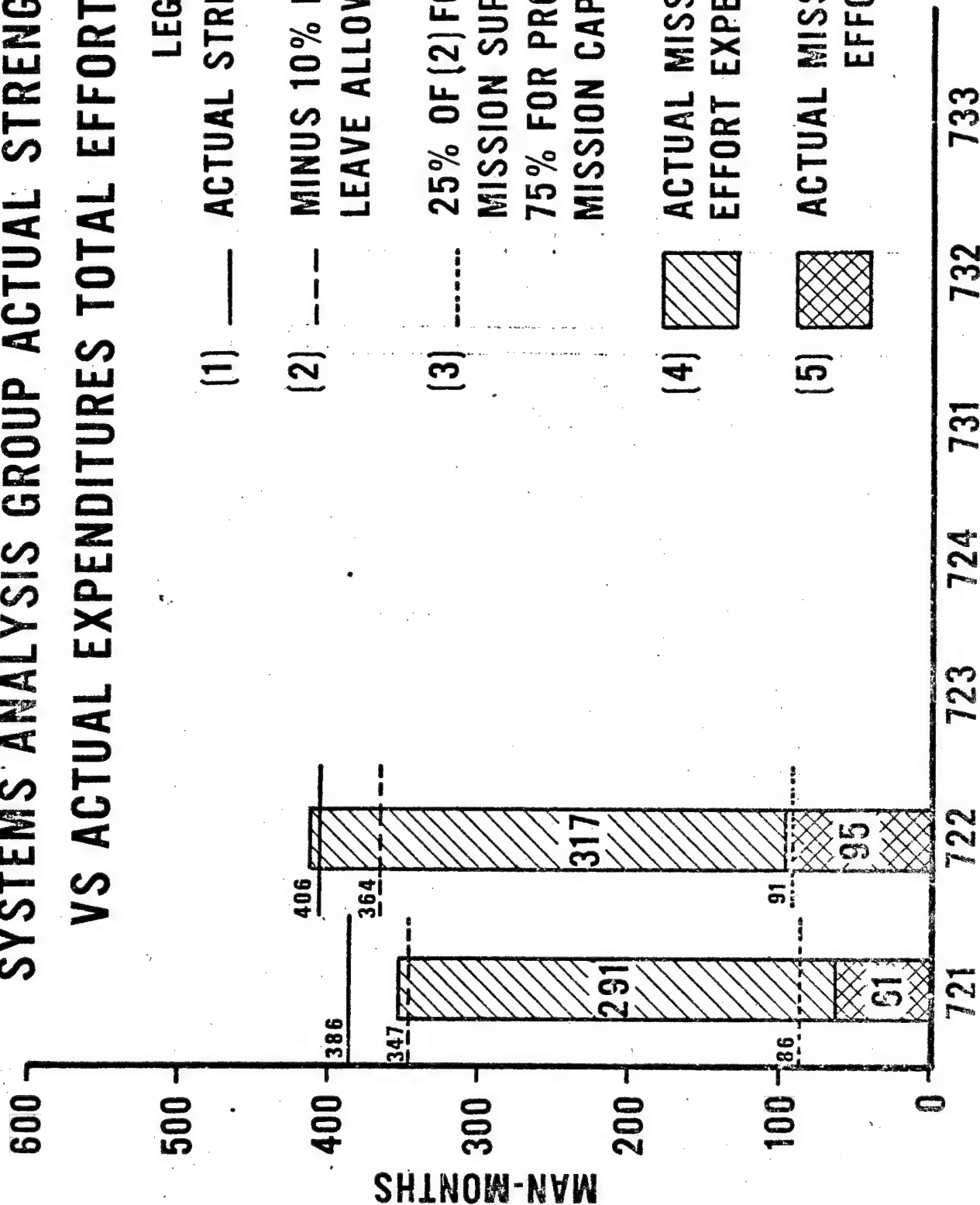
(1) ——— ACTUAL STRENGTH

(2) ---- MINUS 10% FOR
LEAVE ALLOWANCES

(3) ----- 25% OF (2) FOR PROGRAMMED
MISSION SUPPORT LEAVING
75% FOR PROGRAMMED
MISSION CAPABILITY

(4)  ACTUAL MISSION
EFFORT EXPENDED

(5)  ACTUAL MISSION SUPPORT
EFFORT EXPENDED



FISCAL QUARTERS

SUMMER
VACATION

Figure 8.

c. CDC has two complete War Gaming facilities. The facilities theoretically would permit operation of three war games simultaneously. Ten military personnel in-house are used in the operation of these games plus 2 civilians plus 30 Computer Sciences Corporation contract personnel to operate and support the game at Fort Leavenworth. 2000 hours of CDC 3300 computer time per year are used by the War Game facility at Fort Leavenworth. RAC personnel, models, and computer are used to support the War Game at CONFORSG.

(1) The game at CONFORSG is dedicated to CONFORSG activity, specifically the evaluation of the LCS. The game has not been used for anything else.

(2) The game at COMSG has been dedicated to developing and designing the DIVWAG Game. This game is under the control of COMSG. No game has been run on the facility at Fort Leavenworth for three years. Contractor demonstration of the DIVWAG game is scheduled for April 1972. The TRICAP Division is scheduled for evaluation by DIVWAG starting in April 1972, however, no base case is available against which TRICAP can be evaluated.

(3) SA Group has nothing to do with either War Game facility. Determination of whether a war game or some other form of evaluation is more appropriate for a specific project would presumably be made by the scientific advisors for the CG's of CONFORSG and COMSG respectively. This determination should be made by Headquarters USACDC.

(4) It appears that neither War Game facility has been used effectively since neither can be considered to be available to command requirements. A War Game should be just another evaluation tool which could be considered along with simulations and field experiments as possible methods for evaluation of combat development problems. Similarly, war games should benefit

from data collected in field experiments and from the results of model and simulation runs. This interface is extremely difficult if the war games are dedicated to support only their parent group. PALSOG indicated there may be War Game applications which could be applied to their area of responsibility if the game were available to them.

(5) War Gaming is a recognized tool of operations research. It would appear that War Gaming capability should be a part of the organization which is given the mission of providing OR support to CDC. This would make the game available to all users and would insure that gaming is properly considered along with other tools for the evaluation of specific combat developments problems in accordance with CDC command priorities.

d. Dollar resources to support the Contract Study Program amount to \$7,577,000 of FY 72 RDTE funds. Application of these resources is dependent on the ability of CDC to submit Requests for Proposals, let contracts and obligate the funds. In FY 72, the obligation rate as of 31 December 1971 was 25%. However, all funds are earmarked and most are committed.

e. About 150 man-years of effort provided by the scientific support contract at CDEC are all dedicated to the CDEC experimentation program.

Therefore, the best utilization of these scientific assets can be assured by formulating a realistic experimentation program focused on priority CDC projects and scheduled to make full use of the physical facilities at Hunter Liggett Military Reservation and the resources of the scientific contractor in support of these experiments.

6. PROBLEM AREAS.

a. Problem areas focus around seven general areas. These are:

(1) Assignment of OR/SA assets, i. e. , centralized versus decentralized.

(2) Assignment of War Gaming facilities, i. e. , centralized versus decentralized.

(3) Lack of a coordinated plan for evaluation of major combat developments projects.

(4) Possible duplication between activities of OTE Directorate of SA Group and the Contractor at CDEC in support of experimentation.

(5) Optimum mix in CDC OR/SA support: between in-house capability and dependence on contractors.

(6) Increased OR/SA capability to perform increased role in OTE.

(7) Impact of external limitations on alternatives.

b. Assignment of OR/SA assets within CDC.

(1) The decision was made in June 1970 to consolidate civilian Operations Research Analysts in SA Group to improve utilization of these scarce skills and to improve the in-house OR/SA capability of the command. This decision was reaffirmed in December 1970 by the CG. The actual build-up of professional personnel in SA Group was delayed until the last quarter of FY 71. Strengths are shown at Figure 9. Summary strengths are shown below:

	<u>Professional Strength</u>
End 2d Qtr, FY 71	51
End 3d Qtr, FY 71	66
End 4th Qtr, FY 71	92
31 Dec 71 Professional Strength	108 (Incl 4 Interns)

USACDC SYSTEMS ANALYSIS GROUP

000528-PPC

PROFESSIONAL STRENGTH BY MONTHS

SYNTHESIS

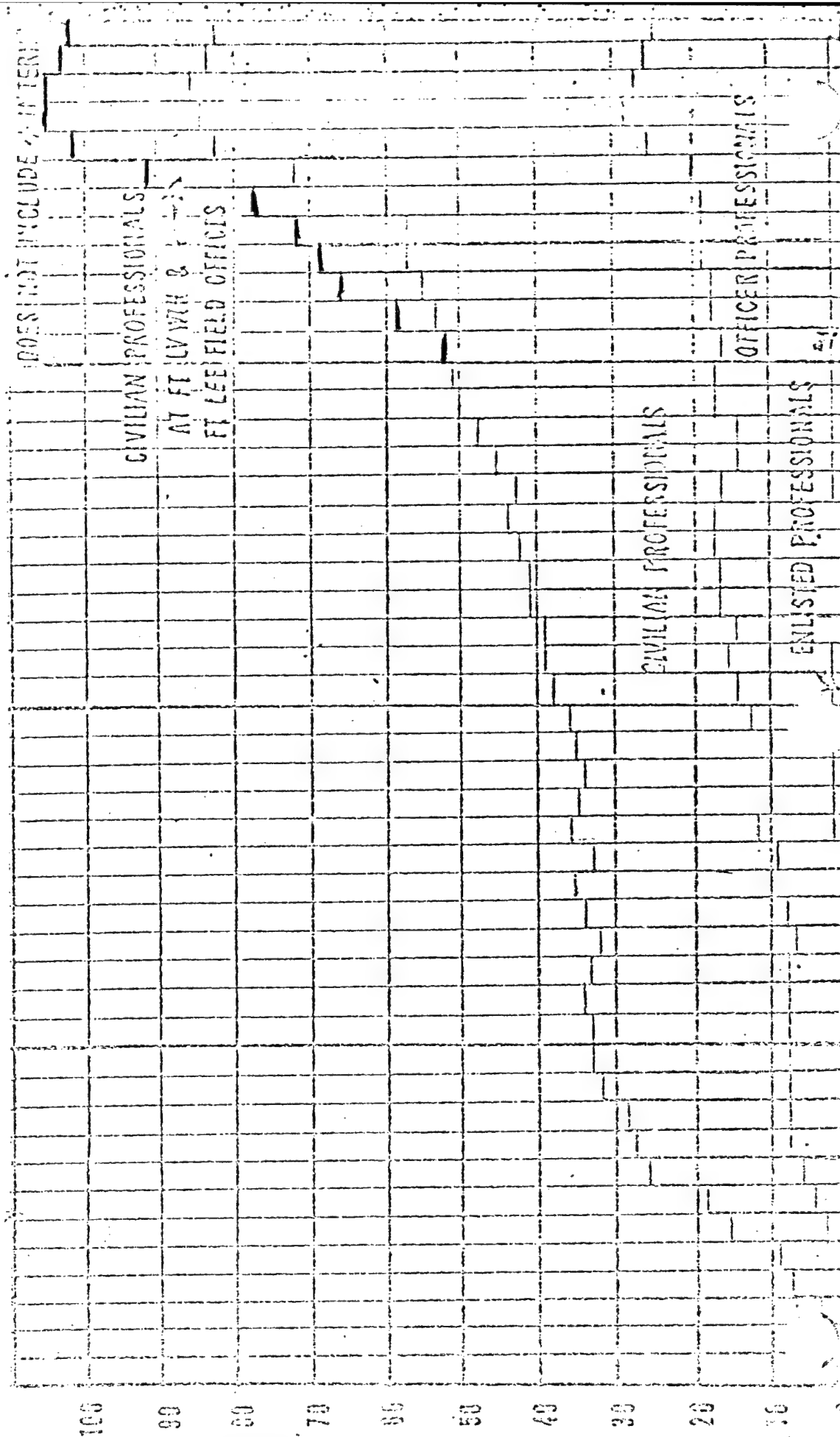


Figure 9 C-20

1 JAN 68 2 FEB 68 3 MAR 68 4 APR 68 5 MAY 68 6 JUN 68 7 JUL 68 8 AUG 68 9 SEP 68 10 OCT 68 11 NOV 68 12 DEC 68

SA Group was given the mission of "providing operations research, systems analysis, and related scientific support for USACDC." In March 1971, the CG, CDC, directed SA Group to specifically write into its mission and functions "the development and maintenance of a capability to support USACDC with scientific advice on planning, design, conduct, and analysis of field experiments and tests." SA Group was reorganized and now has a home office or headquarters at Fort Belvoir, VA, and Field Offices at Fort Leavenworth, KA, and Fort Lee, VA.

(2) Ever since the June 1970 decision, the commanders of COMSG, INCSG, and PALSG have pressed to reopen the decision on consolidation of civilian OR/SA personnel based on the following:

(a) COMSG states categorically that it must have organic OR/SA support to accomplish its mission. It contends that support from the SA Group Field Office is not readily available when needed. It proposes transfer of 14 spaces from the Field Office to COMSG to support a reorganization. See Figure 10. (On 7 February 72 OPCON of the Fort Leavenworth Field Office was given to CG, COMSG).

(b) INCSG states that there is a need for SA Group but that INCSG has a minimum requirement for 11 organic OR/SA spaces for the Group for day-to-day work. These people would become proficient in the area in which they work, i.e., intelligence, communications, etc. The CG, INCSG stated he was getting good help from SA Group.

(c) PALSG stated that the status quo was working and that support from SA Group was good but that a preferred solution would be that the Field Office at Fort Lee be under the operational control of the CG, PALSG. This would make support more readily available to PALSG.

(d) CONFORG had no requirement and therefore made no claim for assets.

FOR REORGANIZATION

	OFFICER	ENLISTED	CIVILIAN	TOTAL
CURRENT TDA	99	24	80	123
SPACES FROM CDR	4	0	5	9
SPACES FROM AYN	16	5	0	21
SPACES FROM MP	0	1	1	2
SPACES FROM SAG	0	0	14	14
TOTAL	119	30	99	237
PROPOSED TDA	122	33	91	246
BALANCE REQUESTED FROM CDR	-3	-3	-3	-9

TOTAL SPACES NEEDED FROM CDR

3

Figure 10
C-22

c. Assignment of War Gaming Facilities in CDC.

(1) At this time both War Game facilities in CDC are assigned to subordinate Groups other than SA Group. Both games are dedicated to projects internal to these Groups. The Project supported by the CONFORSG War Game is SAL Priority Group 4. The DIVWAG project is not on the SAL.

(2) SA Group has the mission to "provide operations research, systems analysis, and related scientific support" to USACDC. War Gaming is a recognized operations research technique. SA Group has had no responsibility for War Gaming in the command because of the assignment of these games to other Groups. This split in responsibility is not in consonance with assigned missions and actually prevents the full utilization of operations research on command problems in the most effective manner. For example, SA Group is limited in its ability to recommend the best means of evaluation for a project since SA Group does not have the full range of command evaluation resources under its control. PAISG has never used a War Game for logistics gaming but stated that a War Game might be applicable to some logistics problems if available. It would appear that limited facilities such as War Games should be assigned to an element in the CDC organization which has the mission of supporting the entire command. Such an assignment would improve utilization of game facilities on command priority projects and should offer a more complete spectrum of evaluation tools to the combat development process.

d. Lack of a coordinated plan for evaluation of major combat developments projects. (par 6e, ref 3)

(1) The current programs for user tests are developed mainly by the suggestion box method. Groups are requested to submit their requirements for tests, these are staffed and test programs are then compiled for Troop Tests, Field Experiments, Field Evaluations, and MASSTER Tests.

(2) In sharp contrast, AR 70-10 provides for a Coordinated Test Program (CTP) for all systems to insure that critical issues are addressed and to describe essential operational test requirements.

(3) CDC should consider the development of a Coordinated Evaluation Program for major combat developments. This Evaluation Program should provide for an ordered, logical sequence of evaluations and tests throughout the life cycle of a major development.

(a) Early in development, specific data are scarce, concepts are broad and organizations are not fleshed out. These conditions lend themselves to gross evaluation techniques such as War Games or low resolution simulations, or experiments designed to evaluate a broad concept.

(b) As development proceeds, specific materiel items evolve and more data become available such as tentative MOS, BOI, component or major system characteristics. Some of these lend themselves to more detailed evaluation techniques such as development tests, simulation, and cost and economic analysis.

(c) When the Expanded Service Test is scheduled, a detailed design for the test will address critical issues identified during development.

(d) As development nears completion it may be possible to design a field experiment with prototypes, early production models or acceptable substitutes to evaluate the doctrine and organizations proposed.

(e) When the first unit is activated, equipped and trained, CDC may schedule either an ICTT, a Field Evaluation, or a MASSTER test to obtain data not previously developed by the Test Program.

(4) Such a Coordinated Evaluation Program would improve the programming of tests, would insure that minimum essential evaluation steps are taken for major developments, would develop a data base concurrently with development, and would put the limited test capability of the Army to work in areas where we could expect the greatest payoff.

(5) This Coordinated Evaluation Program could be developed for major systems or major functional areas (CGMs) by the lead horses in accordance with guidance and priorities established by the HQ USACDC, DCSOPS.

e. Possible duplication between activities of OTE Directorates, SA Group and the scientific support contractor at CDEC in support of experimentation. Interviews between LTC Stewart, MAJ Larsen, HQ USACDC, and COL Cunningham at CDEC indicated the possibility that OTE Directorate personnel of SA Group engaged in 43.6 were duplicating efforts of the CDEC contractor.

(1) On 25 January 1972, MAJ McKinney, SAG, met with the SATE Working Group. A summary of that meeting follows: Tasks and data analyses are divided between the CDEC contractor and SAG personnel so that tasks are not duplicated. The contractor does have the skills and people available to do the same work SAG personnel are doing on 43.6. SAG personnel enjoy a degree of independence from CDEC military personnel which does not apply to CDEC contract personnel since they work for CDEC. Therefore, SAG personnel can get changes made in test design and data collection plans more readily than contractor personnel. Field Experiment 43.6 is an abnormal test since it was directed by ACSFOR but COMSG is the nominal proponent. (Discussions within SATE Working Group indicate this test may not be abnormal, that most CDEC tests may have high level interest which degrades the role of the proponent). SAG assistance to proponent is required early in the test to help with problem definition, and with advice on project analysis. SAG participation in test conduct should be in a monitor role for the proponent. SAG then is required to provide the proponent with an analysis of data and test results.

(2) SAG role in assistance for ICTT would be roughly the same as that provided in Field Experiments.

f. Optimum mix in CDC OR/SA support between in-house capability and dependence on contractors.

(1) Since 1969 CDC has phased out two level-of-effort contractors, namely, CORG, which supported the HQ CDC, and Operations Research, Inc., which supported Strategic Studies Institute at Carlisle Barracks, Pa. The scope of the CSC contract at Fort Leavenworth, Kansas in support of COMSG has been narrowed so that now the contractor only supports COMSG and only in the area of War Game operations and support. The trend has definitely been toward reduction of omnibus-type contract support in favor of in-house support for the command.

(2) There will probably always be a requirement for contractor help in specific areas in which contractors develop expertise and for which it is not economical for the CDC to keep permanent personnel on its staff.

(3) The allegation of duplication of effort at CDEC discussed in paragraph 5 above leads to the question of whether CDEC and CDC can get the most from a contractor who is captive to CDEC and over whom CDEC exercises complete control. An alternative would be to retain the scientific support required to develop and maintain instrumentation and hardware at CDEC and convert the contract effort now available for test design and evaluation to in-house capability at a place which is not dependent on CDEC and which could provide the independent thinking needed in these efforts. This alternative should be studied further by CDC.

g. Increased OR/SA capability to perform increased role in OTE.

SA Group was directed to get into the OTE function by the CG but without any increase in people. The OTE Directorate was formed from within SA Group resources. It receives support within SA Group from the Scientific Support

Directorate in the areas of Statistical analyses and computer programming.

The OTE Directorate is almost totally dedicated to Field Experiments in the

43.- series. In addition it provides comments on test plans and reports to other

directorates in SA Group and to other CDC Groups. Any increase in requests

for support in design of tests, data collection or data analyses will require

increases in spaces and qualified personnel. Considering the mission of SA

Group, the bulk of the OR/SA assets provided to CDC for strengthening the OTE

function should be reassigned to SA Group. This would approximate about 13 spaces.

This support function does not include the OTE teams. This basic capability could

be augmented by transfer of some OR/SA capability from DCS/ OPS to SA Group.

g. Impact of external limitations on alternatives. Critical external considerations which impact on the alternatives being considered include the pending proposal on consolidation of part of RAC with part of CDC and the recent limitation on numbers of CDC civilians permitted in the National Capitol Region (NCR).

(1) If the decision is made to consolidate selected RAC individuals with SA Group, a substantial increase in OR/SA capability and facilities will result. This could support a General Officer as CG of the combined activity and the RAC building could support a further centralization and consolidation of selected CDC activities "under one roof." This would make available to CDC increased OR/SA qualified personnel capability, access to DA developed models and simulations now resident at RAC, and increased prestige and visibility for CDC's Systems Analysis function. This would provide a highly visible and effective vehicle for assuming responsibility for the project analysis and evaluation functions of OTE. The SA Group could then be the focal point for OR/SA assistance in the early steps of OTE, (test design, data collection plans, identification of critical issues) and could assist proponents throughout the test cycle by monitoring tests and finally assist the proponent in the independent evaluation of test data and test reports. Under this proposal, OTE teams could be assigned to any CDC organization, provided they were under centralized control for use to support tests for all proponents. Alternatives include HQ CDC, SAG, or CDEC.

(2) The limitation of 400 CDC civilians in the NCR by 30 June 1972 imposes a very hard constraint on the alternatives being considered by the SATE working group.

(a) Since there are some 459 spaces authorized now in the NCR, three possibilities exist for meeting the limitation.

1. Refrain from hiring people into the some 55 vacant spaces in CDC.

2. Hire into the vacant spaces in the NCR and fire enough people to meet the limitation.

3. Move the vacant spaces and some functions to an area outside of the NCR and hire new people in that location.

(b) Alternatives which involve the physical separation of people from the service are to be avoided if the functions associated with the requirements are still valid.

(c) If these functions and requirements are valid, the mission of CDC demands that the spaces be filled as soon as possible to provide essential personnel capability.

(d) These considerations mitigate against selecting HQ CDC as the place to put the OTE function. This alternative goes against the trend to reduce HQ CDC, and also is incompatible with the NCR limitation on personnel.

(e) Those alternatives which decentralize OTE functions to Groups are weak with respect to visibility for the function, improving professionalism and career development, and are highly dependent on the composition

of the test programs and test proponents from year-to-year.

(f) Two viable alternatives remain. They are:

1. Assign the functions to CDEC, or
2. Assign the functions to SAG at a location other than Fort

Belvoir.

(1) The CDEC Alternative:

a. Advantages:

1. Centralization of OTE functions with an organization which

is already in the Test & Evaluation function.

2. Physical facilities available.
3. High visibility for OTE functions.

b. Disadvantages:

1. Geographically separate from all proponents in CDC.
2. High TDY costs to implement and operate under this alternative.
3. Operational responsibilities in connection with EST, and ICTT

are dissimilar to CDEC's areas of expertise.

(2) The SAG Alternative:

a. Advantages:

1. Combines evaluation functions with analytical functions al-

ready assigned to SAG.

2. Makes available to CDC the entire range of analytical capabilities in SAG to the Evaluation process.

3. Colocation of SAG Evaluation functions at Fort Leavenworth with COMSG would place the function close to the proponent for most tests. Minimized TDY costs would result. Yet, SAG would still provide support to INCSG, PALSG (and, even CONFORG) test requirements as programmed.

4. Would facilitate centralization of the CDC War Game capability under SAG to round out the OR/SA support available to the Command as a whole.

5. Would capitalize on the location of the new computer at Fort Leavenworth as a powerful analytical and evaluation tool.

6. Would support a General Officer position as CG of SATEG (Systems Analysis Test & Evaluation Group) or FASAEG (Field Army Systems Analysis & Evaluation Group). Would give good visibility.

7. CO, SAG, states he would establish an Evaluation Center at Fort Leavenworth to integrate computer availability, war game, and simulation and analytical capabilities of SAG, wherever located. Objective would be to gradually increase the strength at Fort Leavenworth and decrease the strength in the NCR while maintaining a viable OR/SA capability and providing continuity to on-going projects. Maximizes flexibility in use of scarce skills.

b. Disadvantages:

1. Places evaluation function at a level other than HQ, CDC.

2. May separate the evaluation function from the test function (OTE teams).

3. May result in degradation of pure OR/SA effort in favor of OTE effort, depending on command priorities.

7. Alternatives

a. Alternatives for SAG Study Support to CDC.

- (1) Centralized (SA Group)
- (2) Decentralized (Group)
- (3) A combination of (1) and (2), above.

b. Alternatives for SAG Support for T&E Identified during Orientation Briefings at Groups are:

- (1) Assigned to Groups
- (2) Assigned to SAG
- (3) Assigned to HQ CDC

c. Alternatives for Assignment of OTE Teams Identified during Orientation Briefings at Groups are:

- (1) Assigned to Groups
- (2) Assigned to CDEC
- (3) Assigned to SAG
- (4) Assigned to HQ, USACDC.

d. In order to evaluate these alternatives, the SATE Working Group considered the guidance available. This guidance makes it possible to identify some criteria by which the alternatives can be judged. Tentative criteria, based on guidance to the SATE Working Group, are as follows:

(1) An organization which will result in quantum improvement in CDC's OTE contribution to the Army. (Par 1a, ref 4, and Par 3a, ref 3)

(2) An organization which can deal effectively with DA (and DOD) in terms of prestige and organizational placement. (Ref 14).

(3) An organization which will be acceptable to represent CDC to General Officers at DA level. (Ref 14)

(4) An organization with resources and skills to interface with: (Par 5c and 6a, ref 3).

(a) Military and materiel systems oriented personnel from CDC.

(b) Hardware oriented engineers from AMC (and TECOM).

(c) User oriented military from CONARC.

(d) Scientific/technical oriented personnel from LDSRA, AMCSA, and DA/DOD scientists.

(5) An organization which is independent of the contents of the test program. (Example, balance of testing may change from COMSG to INCS or PALSJ proponency from year-to-year.)

(6) An organization with the resources and skills to constitute teams with expertise in test design; data collection, reduction and analysis; instrumentation design and application; and, experience in and understanding of military utility.

(7) An organization which will build on the learning curve of test expertise and techniques and will continue to exploit the lessons learned.

(8) An organization with visibility for the OTE function. (Par 2b, ref 4)

(9) An organization which will be compatible with the lead horse concept. (Strong, medium, or weak.) (Par 2a, ref 4)

(10) An organization which can follow a development (and, in particular, its tests and evaluations) from conception to operational status. (Par 2c, Ref 4), and Par 5b, ref 3).

(11) An organization which will assist in clarifying the responsibility for OTE, including materiel oriented tests of AMC and user oriented tests programmed by CDC. (Par 2e, ref 4)

(12) An organization which will make best use of scarce personnel skills.

(13) An organization which will attract well qualified professional personnel who desire to work in either OR/SA or T&E. (Ref 11)

(14) An organization which provides for career development.

(15) An organization which makes best use of CDC physical facilities.

(16) An organization which will be responsive to command-wide objectives and priorities. (Par 1b, ref 4)

(17) An organization which could accommodate and mesh with a favorable decision on the RAC consolidation.

(18) An organization which is in consonance with the recent NCR limitations.

(19) An organization which will preserve the required command analytic and evaluation capability regardless of decisions on the COA Study.

8. ORGANIZATION

a. Based on the criteria listed in para 7 above, the better organizations appear to be those which: (See Figure 11).

(1) Centralize the OR/SA function. This should include the responsibility for operating the War Gaming facilities at Fort Leavenworth for CDC in support of all groups and in accordance with CDC priorities.

(2) Centralize the OR/SA Support for T&E at the SA Group at Fort Leavenworth. This does not include the assignment of OTE Teams.

(3) Centralize the Assignment of OTE Teams at either (1) SAG, or (2); CDEC, in that order of preference.

b. This organization would support a Medium Lead Horse concept. This concept would reserve for HQ CDC, management of those functions which depend on the use of scarce resources which should be focused on command-wide priority projects; those functions which enjoy high visibility with DA and DOD; and, those functions which should be accorded organizational emphasis (or visibility).

c. This organization would take advantage of the following factors:

- (1) It would provide prestige and visibility for SATE functions.
- (2) It would be independent of the contents of the test program.
- (3) It would provide a pool of varied skills and expertise.
- (4) It would exploit the learning curve.

	ALTERNATIVES OR/SA		ALT SA SPT FOR T&E			ALT ASSGMT OF OTE				
	VERTICAL D SA GROUP	DECENTR GROUPS	GROUPS	SA GRP	HQ	GRPS	CDEC	SA GRP	HQ CDC	
* Quantum Impr in T&E?	S	W	W	S	S	W	M	S	S	
* Prestige & Orgnl Placement?	S	W	W	S	S	W	M	S	S	
Visibility for SATE?	S	W	W	S	S	W	S	S	S	
Effect Repr CDC to GOs at DA?	S	W	W	S	S	W	M	S	S	
* Resources & Skills to Interface										
CDC Policy?	S	S	S	S	S	M	M	S	S	
AMC Hardware?	S	W	W	S	M	M	M	S	M	
CONARC User?	M	S	S	S	S	S	M	M	M	
Scientific Community?	S	W	W	S	S	W	M	S	S	
* Independent of Test Program?	S	W	W	S	S	W	S	S	S	
Broad resources & Skills										
Test Design?	S	W	W	S	M	W	S	S	M	
Data Coll, Red, & Anal?	S	W	W	S	M	W	S	S	M	
Instrumentation?	S	W	W	S	M	W	S	S	M	
Appreciation Mil Util.?	S	S	S	S	S	S	S	S	S	
* Exploits Learning Curve?	S	W	W	S	S	W	S	S	S	
Strong										
* Compatible with/ Lead Horse?	M	S	S	M	M	S	M	M	M	
* Continuity of Test activity?	S	W	W	S	S	W	S	S	S	
Split Mat Test vs User Tests?	S	M	M	S	S	M	S	S	S	
* Utilization of Scarce Personnel?	S	W	W	S	S	W	S	S	S	
Attracts Professional Pers.?	S	W	W	S	S	W	S	S	S	
Provides Career Development?	S	W	W	S	S	W	S	S	S	
Utilization of CDC War Game Facilities?	S	W	N/A	N/A	N/A	N/A	N/A	N/A	N/A	
* Responsive to Cmd Wide Obj & Priorities?	S	M	M	S	S	M	S	S	S	
* Compatible with RAC Proposal ?	S	W	N/A	S	M	N/A	N/A	N/A	N/A	
* Compatible with Limitation on Personnel in NCR ?	S	M	M	S	W	M	S	S	W	
Criterion added 26 Dec 72										
* Preserves CDC Command OR/SA capability regardless of decision on COA Study	S	S	S	S	S	S	W	S	S	

SUMMARY

<u>STRONG</u>	in support of Criteria	23 S	5 S	5 S	23 S	17 S	5 S	14 S	21 S	16 S
<u>MEDIUM</u>	in support of Criteria	2 M	3 M	3 M	1 M	6 M	5 M	8 M	2 M	6 M
<u>WEAK</u>	in support of Criteria	- W	17 W	15 W	- W	1 W	14 W	1 W	- W	1 W
				2 N/A	1 N/A	1 N/A	2 N/A	2 N/A	2 N/A	2 N/A

* Indicates critical criteria

Figure 11

(5) It would enhance the status and utilization of the War Game facilities of the Command.

(6) It would provide incentives for career professional personnel and would attract high calibre talent.

(7) It would insure utilization of scarce personnel in functions commensurate with their skills.

(8) It would exploit access to the new computer at Fort Leavenworth.

(9) It would permit early recruitment of vacant T&E spaces and assist in meeting the limitation on personnel in the NCR.

9. OBSERVATIONS AND CONCLUSIONS.

a. Operations Research includes War Games as a recognized technique for solution of military problems.

b. It is possible to identify specific steps in the LCMM which would benefit from OR/SA input.

c. Since the consolidation of civilian ORA's in SAG, there has been a significant improvement in in-house OR/SA capability of CDC. This includes:

(1) Development of the SAM-I model and "capture" of the model and documentation by in-house personnel in about one years' time. This is a large scale complex detection model. SAG personnel now have the capability to run this model in-house.

(2) On-going effort to develop a large-scale dynamic model of

small unit combat in support of the ASARS II Study. This is the first large scale model development attempted by the Army in-house. Documentation of the model is being accomplished concurrently with model development. This is another "first" in the Army.

(3) Assistance in test design, data collection plans and data analysis for the 43.5 and 43.6 helicopter Field Experiments. Both of these efforts have high level interest. A briefing was presented to the President's Scientific Advisory Council by SAG personnel who were commended for the quality of the presentation.

(4) Improvements in training for professional personnel. This includes a two week short course in Military Operations Research, presented by Dr. Seth Bonder and his staff.

d. The subordinate commands of CDC, other than SAG, still have a substantial OR/SA capability organic to their organizations. These assets suffer from decentralization and are difficult to identify and more difficult to bring to bear on OR/SA problems. Authorizations include 95 fully qualified scientific personnel, 64 prefix H Military with OR/SA executive training, and 10 military personnel trained in operation (play) of War Game.

e. SAG has a wide variety of professional skills to offer to the Command for support of both OR/SA tasks and Test and Evaluation tasks. These skills include various kinds of engineering, mathematics, statistics, physics, operations research, and other scientific and social science disciplines.

f. War Games facilities in CDC are assigned to and dedicated to subordinate commands. The largest facility has not been productive for three

years. These facilities should be centralized under SAG to make them available to the Command in response to CDC priorities.

g. Approximately 94% of SAG professional effort is being expended on SAL projects.

h. COMSG is receiving 569 man-months of professional support from SAG. This amounts to 43.4% of the SAG professional effort.

i. 83% of SAG total 1st Qtr, FY 72, capability was used in Mission effort compared to 75% established as a program objective by DCSOPS.

j. There have been no instances in which support was requested from SAG and was not received or an acceptable alternative proposed. Several instances were cited by Group personnel but on closer examination, were not substantiated.

k. Until the Command is in a state of OR/SA "plenty" it cannot afford to dissipate these scarce assets where they cannot be applied to command priorities. (See Reference 10)

1. The Army user test program lacks direction and structure. CDC should examine the feasibility of developing a Coordinated Evaluation Program for each major combat development project which would complement the Coordinated Test Program (CTP) for Materiel developments and which would give focus and direction to combat developments which are driven by other than materiel considerations such as TRICAP. This should be a part of any proposal CDC makes to DA for improving the OTE functions.

m. SAG is capable of providing the increased OR/SA support required

from the spaces provided by CDC for T&E.

n. Organizational alternatives which feature centralized SATE functions are preferred to those which decentralize SATE functions to Group level. Reasons are outlined in Par C-7 above.

o. A strong "Lead Horse" posture must be achieved by an evolutionary process considering physical facilities and other constraints beyond the control of CDC. Organizational proposals for centralized SATE functions would support a medium "lead horse" concept which features certain excepted areas reserved for HQ, CDC, authority.

p. The mission and tasking of SAG in support of CDC projects being conducted by CDEC should be examined to insure that these tasks do not duplicate those assigned to the scientific support contractor at CDEC. Further, the role of the contractor should be examined at CDEC to insure that full utilization of the contractor is being realized considering the degree of dependence of the contractor on CDEC.

q. An increase of in-house OR/SA capability and a corresponding decrease in level-of-effort contracts would provide more responsive support to the Command, and would reduce overall costs to the Army. However, the availability of personnel spaces would constrain this action. This objective should be adopted as a long range goal and implementation phased as spaces become available.

r. Additional functions assigned to SAG should be located at Fort Leavenworth and merged with the SAG Field Office at that location. Objective should be the development of a CDC Evaluation Center under SAG to

exploit the new computer, the War Game facility, and the flexibility of the entire SAG bank of skills. SAG should be redesignated Field Army Systems Analysis and Evaluation Group (FASAEG).

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ANNEX D TO SATE STUDY GROUP REPORT

Test and Evaluation (T&E)

1. PURPOSE:

To determine the organization and distribution of personnel and functions to provide the greatest probability of successfully completing all test and evaluation responsibilities assigned to USACDC.

2. DEFINITIONS: See Appendix 1.

3. GENERAL:

a. The test and evaluation effort within the Army is divided into two major types, developmental tests and user field tests. At DA Staff level, the CRD has responsibility for developmental tests and the ACSFOR has responsibility for user field tests. At the major Army command level, the Materiel Developer (normally USAMC) is responsible for developmental tests and the Combat Developer (normally USACDC) is responsible for user field tests.

b. AR 70-10 (Test and Evaluation during Development and Acquisition of Materiel) prescribes policy, responsibilities, and procedures for developmental tests conducted during the acquisition process for materiel systems. Tests conducted under provisions of this regulation are materiel and technically oriented, and are normally conducted in a fixed sequence that logically supports the materiel acquisition process. Developmental tests are designed to determine the degree to which an item meets the materiel need (MN) document against which it was developed and if it is operational effective and suitable for Army use.

c. AR 71-3 (User Field Tests) prescribes policy, responsibilities, and procedures for user field tests and may be either materiel or conceptually driven. User field tests can verify the operational effectiveness and suitability of total materiel systems or provide verification for doctrinal, tactical, procedural or organizational concepts. Tests of the latter type are not conducted sequentially as part of the materiel acquisition process and can be conducted at any time in the materiel acquisition process. They may also experiment with alternative new concepts to determine likely solutions.

d. Operational Test and Evaluation (OTE). A major weakness of the validation process in the acquisition of materiel has been the late integration of operational considerations into the materiel development testing cycle. To correct this deficiency, recent DOD/DA directives and memoranda have placed increased emphasis on early injection of operational considerations in the testing of materiel systems and an independent evaluation by CDC of the overall military worth, operational effectiveness and suitability for Army use of proposed systems prior to major decisions. This process, referred to as Operational Test and Evaluation (OTE), has been superimposed on the existing materiel ^{/life} cycle. In effect OTE serves as a transition between developmental and user field tests. Though OTE can be conducted at any time in the life cycle it is generally limited to participation in and evaluation of the Development Suitability Test (DST), Expanded Service Test (EST) and Intensified Confirmatory Troop Test (ICTT). The interface of OTE between developmental and user testing together with assigned staff responsibilities, is depicted in Appendix 2.

4. TEST AND EVALUATION IN THE MATERIEL ACQUISITION PROCESS:

The purpose of materiel testing, and evaluation of test results, is to continually guide the materiel acquisition effort and provide a basis for determining the operational effectiveness and suitability of a new materiel system for Army use. CDC has a vital role in both developmental and user field tests. The following discussion is a summary of the CDC responsibilities as they relate to the total test and evaluation effort in the materiel acquisition process. Emphasis will be placed on the new functions assigned to CDC by AR 70-10 and DA directives on OTE, including the ACSFOR letter dated 30 November 1971, Conduct of Operational Test and Evaluation.

a. Materiel Need (MN) Documents. The genesis for all tests is the MN document prepared for each new item. This document thus establishes the requirement for all materiel tests. Recent DA guidance on the conduct of OTE tasks CDC to identify critical questions and issues to be addressed during tests of the proposed item. To accomplish this task CDC will, as a continuing new requirement, initially identify and continually refine critical issues and questions that must be answered during the test program. These issues will be identified and attached as an annex to the draft MN document. Early identification of critical issues is necessary to guide preparation of the Systems Development Plan (SDP) and/or the Coordinated Test Program (CTP) prepared by the Materiel Developer. The key issues to be resolved by testing are thus available to the Materiel Developer, Project Manager or Commodity Command during their initial deliberation in preparation of the CTP.

b. Coordinated Test Program (CTP). AR 70-10 requires CDC to comment on all CTP's and recent DA guidance on the conduct of OTE states CDC will identify and clearly state critical issues in the CTP. The CTP which is prepared during the Conceptual Phase of the acquisition process, is the single most important of all materiel test programing documents. This document formally structures the testing effort by stating what tests are necessary to determine the operational effectiveness and suitability of a new system. It is prepared and maintained by the Materiel Developer, coordinated with CDC and approved by CRD. For major systems, the CTP is attached as an annex to the SDP. The major purpose of the Conceptual IPR (formerly the SDP/CTP IPR) is to approve the SDP and/or the CTP. Particularly important in the USACDC review and coordination of the CTP is the refinement/revalidation of the critical issues and the adequacy of OTE objectives specified in the DST and EST annexes. This task will be partially accomplished by revalidation of critical issues in the MN document. Each critical issue in the CTP will be challenged for validity and changed as necessary to fully address OTE. The outline for each developmental test or ICTT contained in the CTP should state which critical issues will be tested during that test. CONARC training issues, LDSRA logistical issues and AMC technical issues must be included and are consolidated by CDC with all operational, doctrinal, organizational, and tactical issues. The CTP must insure that critical issues concerning the proposed system will be answered by testing prior to the Development Acceptance (DEVA) IPR. For major systems

OTE that cannot be addressed prior to the DEVA IPR will be satisfied during the conduct of the ICTT or other user field tests, which CDC is responsible for defining and outlining in the CTP. The CTP is thus a compilation of test proposals concerning each new materiel system.

c. DST and EST Plans. Although the DST and EST are developmental tests, they address OTE and the Detailed Test Plans (DTP) must be approved by CDC. By far the more important is the EST. Since only two DST's are currently projected over the next three years, their effect on CDC manpower requirements is minimal and further consideration will not be given to this test during this study effort. The development of the DTP for the EST revolves around the initial efforts of the Center Team. CDC plays a vital role in the Center Team Concept at agency level and further refinement and revalidation of critical issues thus forms an important input to the development of a successful DTP by the TECOM boards. CDC's major role in the preparation of the DTP is to convert critical issues to test objectives/subobjectives and output data requirements that will satisfy the OTE issues. This project analysis effort revolves around the CDC agency and its relationship with the Center Team. Systems analysis support may be required by agencies. The EST plan, prepared by TECOM boards in coordination with the appropriate CDC agency and other Center Team members, is then submitted through HQ TECOM to the CG CDC for final approval. See Appendix 3 for CDC responsibilities in preparation of test plans.

d. Conduct of EST. CDC participates in the conduct of the test to the degree necessary to prepare its independent evaluation of the systems operational effectiveness and suitability. This participation includes observation of all test activities and independent analysis of test data necessary to develop CDC findings and conclusions and prepare an independent evaluation report. CDC participation excludes authority for test direction, control or supervision; but includes responsibility for advising the TECOM Test Director of all situations and actions detected during the test which require remedial action to meet OTE requirements.

e. Independent Evaluation of EST Results. The Independent Evaluation of the EST is a new mission assigned CDC by DA. This evaluation is in addition to the requirement for review of the EST report stated in AR 70-10 and is based on CDC observation of the test and analysis of available test data from the EST and any former tests or studies conducted that provide information on the system being evaluated. This evaluation is based on available data and the subjective judgment of those participating in the evaluation effort. OR/SA support may be required during this review, analysis and evaluation (RAE) effort. See Appendix 4 for CDC responsibilities in test reports and evaluations.

f. Intensified Confirmatory Troop Test (ICTT). The ICTT is a new type of user field test of early production models or preproduction prototypes specifically designed to obtain OTE data upon which type classification and/or

initial production decisions may be made.

(1) In the ideal case it will follow the EST utilizing a limited number of production models manufactured and acquired as a result of the limited production decision. The ICTT will be planned, programmed, and budgeted for by CDC. It will be executed by CONARC or another designated major Army command with the assistance of CDC. The CONARC test report will be submitted to the CG CDC following the test and CDC will be required to submit an independent evaluation of the system's operational effectiveness and suitability to HQ DA (ACSFOR) for review prior to the OSD major production decision (DSARC III). This model for major systems is referred to as the Development Program Model, or "ideal case" and is depicted at Appendix 5. An example of a system using this model will be the MICV.

(2) There are two alternative models (see Appendix 5) for development and validation of a major system. The second model, Early Major Production Decision Model, is utilized if military urgency requires or if an unwarranted increase in cost would result from a limited (or lengthened) production schedule. Essentially the second model dictates that the EST, using preproduction items must include all essential operational testing possible. This model still envisions the use of an ICTT after the major decision to insure adequacy of the basis of issue (BOI), training, utility in the hands of the user, logistical support, and doctrine. Examples of systems which will use this model are DRAGON, M60A2, and Improved HAWK.

(3) In the third model (Additional OTE on Prototypes Models) it may be desirable and practical to conduct an ICTT with preproduction models to obtain additional operational test data following the EST. Examples of systems which will use this model are ARSV and SAM-D.

(4) DA has directed that these models be utilized for all major systems and that the principles of early OTE before the production decision be applied to both major and minor systems. This guidance will be contained in the next revision of AR 71-3 and is presently contained in the DA letter of 30 November 1971.

(5) In the next two years ICTT's are presently planned for the FAAR, DRAGON, Improved HAWK, LANCE, and M60A2. Modified troop tests of other systems will accomplish much the same objective as an ICTT and are scheduled on TACFIRE, TASS, GOER vehicles, Scatterable Mines, and FAMECE. Most of these tests will be conducted subsequent to the major production decision and thus will seek to resolve selected doctrinal, logistical, training, and organizational issues which have developed.

(6) CDC has a specific requirement to provide a test support cell to CONARC to assist in the design of the detailed test plan (DTP) for the ICTT, conduct of the test, analysis of test data, and writing of the report. Thus, CDC is required not only to perform an analysis of the test requirements, prepare an outline test plan (OTP) and a test support package (TSP) but is required to attach a cell of test experts to the CONARC Test Director.

g. Military Potential Test (MPT). The MPT has always been a developmental test with a strong OTE flavor. The primary purpose for the test is to evaluate the potential of an off-the-shelf commercial item or item from an allied nation's military inventory to satisfy an immediate materiel need of the US Army. The ACSFOR letter of 30 November 1971 changed this test from a developmental test to a user field test with DA staff proponenty changing from OCRD to ACSFOR. No other guidance has been received on CDC's responsibilities. However, action officers revising AR 71-3 indicate that CDC responsibilities will be similar to those in the DST and EST; i.e., assist in planning, participate in the test, prepare an evaluation of the test results and present evaluation results at any subsequently scheduled IPR to make a decision where the item should enter the life cycle. The AMC/TECOM schedules for MPT are not well defined at this time and further study will be required to estimate CDC workload and responsibilities in the MPT.

h. MASSTER Materiel Field Tests (MFT). MASSTER conducts MFT as part of the developmental process on selected STANO items. However since AMC, and not CDC, is proponent for these tests the review/comment and workload on these test plans and reports are very small and will not be further considered in this study.

5. TEST AND EVALUATION IN THE COMBAT DEVELOPMENTS PROCESS:

Certain testing and experimentation done by the US Army is primarily oriented on the future combat developments process. These tests are thus primarily conceptually driven in contrast to being materiel oriented. Prime examples

of such tests are the ACCB/TRICAP series of tests by MASSTER at Fort Hood and the series of Attack Helicopter Experiments by CDEC at Fort Ord. Such tests provide the combat developments process with a vital tool to develop, examine, compare, or validate new doctrinal, procedural, or organizational concepts. They provide the objective scientific basis for continued development of new concepts. They may be employed to test new materiel concepts before prototypes are available to enter testing in the materiel life cycle. User field tests (though including the ICTT) are generally oriented to the combat developments process. The following is a summary of the CDC responsibilities as they relate to the test and evaluation effort in the combat developments process. Emphasis will be placed on the new functions assigned to CDC by AR 70-10, DA directive on OTE and a draft copy of AR 71-3 dated January 1972 (presently being staffed at HQ DA).

a. ICTT. The ICTT will provide valuable inputs to the combat developments process, but as a materiel oriented test it was discussed in paragraph 4f above.

b. Joint Tests (JT). CDC has participated in selected joint tests in the past (to include C5A) which were formed to meet specific requirements of ACSFOR. Although not within the definition of OTE, JT's were envisioned to require the same CDC responsibilities, level of support and command emphasis as ICTT's. There are currently three Joint Tests which CDC is required to support. Further requirements may be placed on CDC by DA to support and act as proponent for JT's.

c. Troop Tests (TT) and Field Evaluations (FE). TT and FE are user field tests for which CDC has been responsible in the past. In general these tests are conducted in the Production and Deployment Phase of the LCMM in support of the combat developments process. Normally such tests seek to verify or establish new procedures, techniques, doctrine, or organizations. However, these tests may be materiel-oriented and normally would employ production items. However, new materiel and doctrinal tests may be designed to justify or experiment with future combat or materiel developments and in this case would fall into the conceptual phase of the LCMM. The most recent draft of AR 71-3 received unofficially on 12 January 1972 indicates that CDC will continue to be responsible for planning, programming, and budgeting for these tests. However, CDC will now be required to provide assistance to the designated major Army commands responsible for conduct of these tests in a manner similar to that provided for ICTT and JT. Since this is a new mission, it has increased the manpower requirements for T&E in CDC.

d. Field Experiments (FLD EXP). No significant changes have occurred in CDC or CDEC responsibilities for planning, conducting, and reporting of FLD EXP.

e. MASSTER Systems Tests. A new Memorandum of Agreement (MOA) has been prepared and approved by the CG CDC and CG MASSTER which modifies previous agreements, test planning procedures, terminology, and responsibilities by CDC in regard to Systems Field Tests (SFT) and Materiel/Systems

Field Tests (MSFT). CDC is now responsible for chairing a joint MASSTER/CDC work group which will produce the Concept Test Plan (replacing the former OTP) which must be approved by both CG CDC and CG MASSTER. MASSTER then chairs a joint effort to produce the Detailed Test Plan (DTP) which also must be approved by MASSTER and CDC.

f. Combat Evaluations. These user field tests are field evaluations (FE) conducted in combat. The number of these tests has drastically been reduced in proportion to the withdrawal from Vietnam. CDC is not involved in these tests, nor should it be for the foreseeable future. They will thus not be discussed further in this study.

6. CDC RESPONSIBILITIES IN T&E;

a. In summary, the new or expanded tasks assigned CDC by AR 70-10, draft AR 71-3, and recent DA directives on OTE are:

(1) Identify critical issues during the Conceptual Phase of the acquisition process and attach as an annex to the draft MN.

(2) Review and validate the critical issues during development of the CTP, assess the adequacy of EST operational testing described in the CTP, and make recommendations for user field tests to be included in the CTP.

(3) Assist TECOM in preparation of the DST and EST plans to insure that the test planned will satisfy OTE requirements.

(4) Participate in the conduct of the DST and EST to the extent necessary to conduct an independent evaluation.

(5) Evaluate user suitability of materiel throughout developmental cycle.

(a) Conduct an independent evaluation of each major materiel system's operational effectiveness and suitability for Army use prior to the major production decision.

(b) Presentation of an independent evaluation and analysis of OTE data and results at IPR's, with emphasis on the Development Acceptance (DEVA) and Production Validation (PROVAL) IPR's.

(6) Budget for user participation in developmental testing as a part of the OTE process.

(7) Program, plan, and budget for an ICTT for major systems.

(8) Provide assistance to commands designated to conduct tests in support of OTE and other user field tests; to include preparation of the DTP, conduct of the test, analysis of test data, and preparation of the test report.

b. Figure D-1 divides every type of major test in which CDC participates into eight separate and sequential steps. In general, CDC groups and agencies are responsible for Steps 1, 2, and 8. Step 3 is a HQ CDC, HQ AMC and/or DA responsibility, while Steps 4, 5, 6, and 7 are the responsibility of a professional test organization. Usually CDC and/or the professional test organization will approve the Detailed Test Plan developed in Step 5.

RESPONSIBILITIES

T&E STEPS	OTE		USER FIELD TESTS		
	DST/EST	ICTT	TT/FE/JT	FLDEXP	SFT/MSFT
1 - Rqmts	AMC/CDC	AMC/CDC	CDC	CDC	CDC/AMC/ASA/LWL
2 - Proposal	AMC (CDC)	AMC/*CDC	*CDC	*CDC	*CDC
3 - Directive	AMC/DA	DA	DA	CDC/DA	DA
Proj 4 - Analysis	TECOM *(CDC)	*CDC (CONARC)	*CDC (CONARC)	CDEC *(Gps)	MASSTER/*CDC
5 - DTP	TECOM *(CDC)	CONARC *(CDC)	*CONARC (CDC)	CDEC	MASSTER *(CDC)
6 - Test	TECOM (CDC)	CONARC *(CDC)	*CONARC (CDC)	CDEC	MASSTER
7 - Report	TECOM	CONARC *(CDC)	*CONARC (CDC)	CDEC	MASSTER
8 - RAE	*CDC	*CDC	*CDC	*CDC	*CDC

*Requirement for CDC OR/SA Support.
 () Requirement for CDC assistance.

Figure D-1

(1) In all types of tests CDC groups and agencies are primarily responsible for the development and definition of test requirements (Step 1) and subsequently the review and/or submission of a test proposal (Step 2). The documents which accomplish this action in OTE are the MN and the CTP. For other user field tests CDC studies, concepts, models, simulations, and analyses generate test requirements which are translated into specific test proposals by means of

Test resumes and Test Concept Papers (for MASSTER tests), draft Outline Test Plans for ICTT and other user field tests and Test Proposals for field experiments. A definite need is envisioned in Step 2 to provide systems analysis support to CDC action groups.

(2) Step 3 entails preparation of a Test Directive (by either HQ AMC, HQ CDC, or DA) for all tests in which either more than one CDC group (for CDC directives) or more than one major Army command (for DA directives) will have responsibilities for support of the envisioned test. The directive is necessary to establish the purpose of the test and the necessity for the test. It authorizes expenditures of resources to conduct the Project Analysis and continue planning. It outlines responsibilities of all participants.

(3) Steps 4 through 7 entail actions required of the professional testor or test organization in coordination and with the assistance and approval of the proponent. For developmental tests (DST and EST) CG TECOM is the testor and has resources necessary to plan, conduct, execute, and report the test results, including organic or available systems analysts. For MASSTER tests, CG MASSTER is the testor and has the same professional capability. For field experiments, CG CDEC is the testor and has the same professional capability. However for ICTT, TT, FE, and JT, CONARC or other major Army commands are designated as the testor but do not have the professional test capability available to TECOM, MASSTER, or CDEC. DA has recognized this situation and has provided CDC resources to develop this professional test capability. DA has directed CDC to provide support to each CONARC Test Director in the design (project analysis) and

preparation of detailed test plans (DTP), conduct of the tests, data analysis and preparation of the test reports. The CDC OTE Organizational Concept Paper submitted to DA on 30 June 1971 recommended this professional test capability be developed in the T&E Directorate at HQ CDC and that 45 spaces be added to CDC TDA to accomplish this task.

(4) Step 8 in the test process is the CDC responsibility for review, analysis, and evaluation (RAE) of all types of tests and test results, to include the new requirement for an independent evaluation of proposed materiel systems' operational effectiveness and suitability for Army use prior to major production decisions. This task is currently accomplished by CDC groups and agencies which are required to review all test results and reports, collect independent data, assess the implications and impact of other studies, analyses, war games, models, simulations, and subjective opinion, and prepare a CDC command position on each test and/or system. Systems analysis support will be required by groups and agencies in this step and must be available for their use. These procedures separate the command which proposes the test from the professional testor who executes the test. They also separate the professional testor from the command responsible for passing judgment on the validity and impact of the test. This separation of the professional testor from Steps 1, 2, and 8 is considered vital to the test process to insure unbiased evaluation of test results.

7. CURRENT CDC T&E ORGANIZATION AND FUNCTIONS:

a. Responsibility for test and evaluation activities at HQ CDC is currently divided between the T&E and MS Directorates. This division of responsibility

parallels the DA staff division of staff responsibilities between CRD and OACSFOR.

b. HQ CDC MS Directorate. MS Directorate is currently responsible for staff supervision of all matters relating to the MN, CTP, DST, MPT, MFT, EST, and all other developmental tests and evaluations. Though MS Directorate has no officers fully dedicated to developmental tests, the materiel systems staff officers have continuous responsibilities for all matters relating to their system from MN development through fielding of the final system. Each officer (out of a total of 63 personnel in the MS Directorate) spends about 5 percent of his time directly on DST and EST matters.

c. HQ CDC T&E Directorate. The T&E Directorate is responsible for staff supervision of all matters relating to user field tests to include the ICTT, FLDEXP, MASSTER tests (less MFT), JT, FE, TT, and Combat Evaluations. The T&E Directorate is organized as shown at Figure D-2.

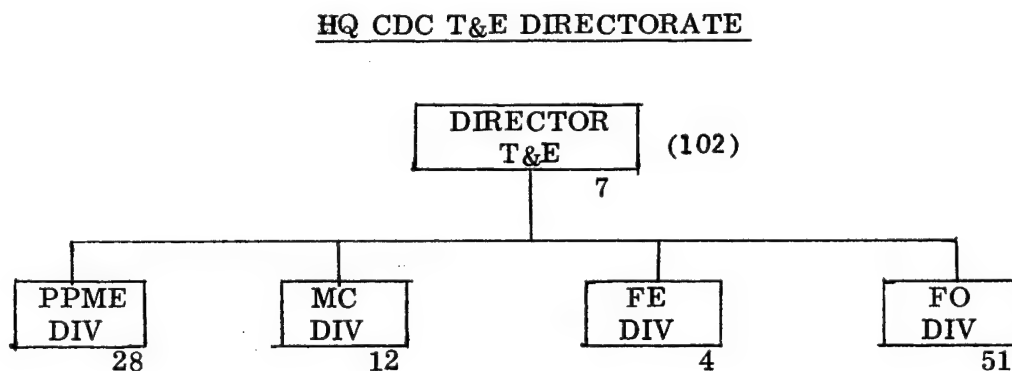


Figure D-2

This directorate includes the 45 spaces allocated by DA to develop a professional test capability in CDC for user field tests. The functions of the divisions are as follows:

(1) Office of the Director - 7 personnel: This office (theoretically headed by a BG) directs all T&E activities for the CG CDC, and provides administrative support to the entire directorate.

(2) The Plans/Programs, Methodology and Evaluation Division - 28 personnel: The Office of the Division Chief (3 personnel) directs the two branches of the division. The Plans and Programs Branch (10 Personnel) develops and maintains the Five-Year User Field Test and Field Experimentation Program (CDC Pam 71-12), budgets for all T&E activities, maintains test files on CTP, EST, ICTT, and all user field tests, and administers four separate smaller programs. The Methodology and Evaluation Branch (15 Personnel) conducts Project Analysis of all test proposals, RAE of all test results, and prepares and coordinates the CDC command position on all test results. The branch also reviews and comments on all CTP and EST plans and reports for adequacy of OTE requirements and submits these comments to MS Directorate.

(3) The Field Experimentation Division - 4 personnel: This division monitors all field experiments, coordinates resources required, provides staff supervision over the mission performance of CDEC, coordinates group and agency input to the experimentation program and prepares command positions on the reported results of CDEC experiments.

(4) The MASSTER Coordination Division - 12 personnel: This division monitors all IBCS/STANO/ACCB/TRICAP testing at Fort Hood, coordinates all resources for MASSTER tests, prepares the CDC input to the DA Five-Year MASSTER Test Program and coordinates and prepares all CDC command positions on the results and reports of MASSTER tests to include all MFT, SFT, and MSFT.

(5) The Field Operations Division - 51 personnel: This division monitors the near term execution of all ICTT, JT, FE and TT; assists in Project Analysis of all test proposals and provides Test Support Cells to support CONARC Test Directors in preparation of DTP's, conduct of tests and preparation of test reports.

d. Responsibilities, procedures, and organizations for conduct of test and evaluation activities differs at each of CDC's subordinate action groups.

(1) HQ COMSG is organized for T&E similarly to HQ CDC. The T&E Directorate is responsible for all staff actions for user field tests to include the ICTT. The two Systems Directorates are responsible for the CTP and all developmental tests and the independent evaluation.

(2) HQ INCSG is organized with a T&E Directorate which has across-the-board staff responsibility for all staff actions in the CTP, development tests, independent evaluations, and user field tests. The directorate is small and relies on the other Systems Directorates of the headquarters to provide 2 to 3 times the manpower required by T&E personnel to support T&E actions.

(3) HQ PALSG is organized with a small Evaluation Division of the Organization, Doctrinal Publications and Evaluation Directorate which has

staff responsibility only for nonmateriel oriented user field tests. The Materiel Directorate has staff responsibility for the CTP, developmental tests, the Independent Evaluation, all ICTTs, and materiel oriented user tests.

(4) HQ CONFORG is organized with only two officers in the Directorate responsible for most staff actions pertaining to all tests.

e. CDEC's mission, responsibilities, functions, procedures, and organization for conduct of field experiments are clearly defined, and were recently revised in CDC Reg 10-1, CDEC Supplement 1 to that regulation and the CDEC Experimentation Manual.

f. Current regulations, guidance, and procedures for participation by CDC groups and agencies in all facets of developmental and user field tests, to include the critical issues, the CTP and the Independent Evaluation are very limited, out-of-date and are in need of drastic revision. (See Appendix 6.)

8. TEST SCHEDULES AND MANPOWER REQUIREMENTS.

a. General. Only recently (in the past six months) has CDC made a decisive effort to develop a clearly defined T&E program and schedules in all areas of CDC responsibility. The programs recently developed have resulted in a Five-Year User Field Test and Field Experimentation Program (CDC Pam 71-12, dated 1 February 1971). Several deficiencies or problems, however, remain to be resolved in the area of test programming and scheduling.

(1) One deficiency is that current T&E programs must be correlated with the CPO's and the CGM's which either have been, or soon will be, published. This should be a group responsibility as part of their overall management of assigned CGM's. The test programs developed should support CGM's or they should be reexamined for possible deletion from the T&E programs. A methodology should be developed to identify conceptual or user field test requirements related with the CGM's.

(2) A second problem lies in the lack of a system of scheduling tests and experiments balanced against the capabilities of available CDC manpower. Developmental tests are scheduled by AMC/TECOM. MASSTER tests are scheduled by DA, although CDC participates in the Test Schedule Review Committee (TSRC) which approves the MASSTER test program. ICTT and Joint Tests are also scheduled by DA, DOD or the CTP. Thus, shifting of schedules to remain within available manpower resources must be accomplished within Field Experimentation, Troop Test and Field Evaluation schedules. The TSRC process of scheduling should be used for all user field tests and experiments.

(3) A third problem lies with monitoring the development, planning, coordination and approval of all developmental test plans and reports; particularly, those relating to the EST. Each CDC group headquarters is organized differently to accomplish this task. All should have a single office with sole responsibility.

b. Current Schedules for FY 723-752.

(1) At Appendix 7 is the projected EST schedule with proponent groups and agencies identified. At Appendix 8 is a recapitulation of EST's by group and agency for the period FY 72 through FY 74.

(2) At Appendix 9 is the projected user field test schedule.

(3) These schedules were utilized to calculate manpower requirements presented below.

c. Group and Agency Manpower Requirements.

(1) Identification of critical issues (See Par 4a). Since this is a new task, no experience factors are available upon which to base manpower requirements; however, CDC has historically forwarded to DA an average of about 100 requirement documents per year for approval. Based on past experience, 12 of these requirement documents may be considered in the "major" system category. Considering the above, the group percentages shown at Appendix 8 and a planning factor of one man-month of effort for major systems and one-half that for minor systems, CDC will annually expend the manpower shown in Figure D-3.

ANNUAL CRITICAL ISSUE MANPOWER REQUIREMENTS

	<u>COMSG</u>	<u>PALSG</u>	<u>INCSG</u>	<u>CONFORG</u>	<u>TOTAL</u>
Man-months	43	7	4	2	56
Man-years	3.6	0.6	0.3	0.2	4.7

Figure D-3

(2) CDC review and comment on the CTP (See Par 4b). Review of the CTP must also be accomplished at group and agency levels as a part of the Center Team. Historically, CDC reviews and coordinates about 50 CTP's annually. Considering the effort to refine and recast critical issues and review of the total document to insure it adequately addresses OTE, it is estimated that two man-months will be required for major systems and one man-month for minor systems. Assuming that six of the 50 CTP's will be on major systems and the percentages in Appendix 8 to Annex D are valid, CDC will expend annually the manpower shown in Figure D-4.

ANNUAL CTP MANPOWER REQUIREMENTS

	<u>COMSG</u>	<u>PALSG</u>	<u>INCSG</u>	<u>CONFORG</u>	<u>TOTAL</u>
Man-months	43	7	4	2	56
Man-years	3.6	0.6	0.3	0.2	4.7

Figure D-4

(3) Assistance in preparation of DST and EST Plans (See Par 4c). This task in actuality represents an increase in level of effort for an existing task. Conversion of critical issues (now stated in the MN and the CTP) to test objectives and EEA that support OTE will increase CDC participation in DST and EST planning. The CDC level of effort to support TECOM in preparation of EST plans for FY 73 is summarized in Figure D-5 and is further detailed at Appendix 10 for FY 723-744. The input used to develop these tables was provided by the CDC groups and agencies on a test-by-test basis.

FY 73 EST PLANNING MANPOWER REQUIREMENTS

	<u>COMSG</u>	<u>PALSG</u>	<u>INCSG</u>	<u>CONFORG</u>	<u>TOTAL</u>
Man-months	49	7	8	1	65
Man-years	4.0	0.6	0.7	0.1	5.4

Figure D-5

(4) Conduct of EST (See Par 4d). This task also represents an increase of effort from "monitor" under the old AR 70-10 to "participate to the extent necessary to conduct an independent evaluation" under recent DA guidance (30 November 1971 ACSFOR letter). The CDC level of effort to perform this function in FY 73 is summarized in Figure D-6 and is further detailed at Appendix 11 for FY 723-744. The input used to develop these tables was provided by CDC groups and agencies on a test-by-test basis.

FY 73 EST PARTICIPATION MANPOWER REQUIREMENTS

	<u>COMSG</u>	<u>PALSG</u>	<u>INCSG</u>	<u>CONFORG</u>	<u>TOTAL</u>
Man-months	262	75	7	1	345
Man-years	21.8	6.2	0.6	0.1	28.7

Figure D-6

(5) Independent Evaluation of EST Results (See Par 4e). This responsibility is a new task and CDC's only experience to date is the Independent Evaluation conducted on the M60A2 task which required 40 man-months of effort at group and agency level. Current DA directives

(ACSFOR letter of 30 November 1971) requires CDC to conduct this Independent Evaluation on all systems. The level of effort expended will vary greatly between major and minor systems, and more definite manpower requirements will evolve as experience is gained in this area. The CDC manpower requirements for Independent Evaluation in FY 73 are summarized in Figure D-7 and are further detailed at Appendix 12 for FY 723-724. The input used to develop these tables was also provided by CDC groups and agencies on a test-by-test basis. Total EST manpower requirements for FY 72-74 are summarized at Appendix 13.

FY 73 INDEPENDENT EVALUATION MANPOWER REQUIREMENTS

	<u>COMSG</u>	<u>PALSG</u>	<u>INCSG</u>	<u>CONFORG</u>	<u>TOTAL</u>
Man-months	138	2	4	1	145
Man-years	11.4	0.2	0.3	0.1	12.0

Figure D-7

(6) Reliability, Maintainability and Availability (RMA). PALSG and MA are charged with the responsibility for RMA review of all materiel tests as a service for all CDC groups and agencies. PALSG manpower estimate for RMA review of all EST's during FY 73 is 256 man-months (21.3 man-years).

(7) User Field Tests. (See Par 4f above). CDC manpower requirements to support all user field tests in FY 73 are summarized in Figure D-8 and detailed at Appendix 14. These estimates were obtained based on a designation of each test by the proponent groups as being either small, medium or large (as shown at Appendix 9) and then the planning factors shown at Appendix 15 were utilized to calculate total manpower requirements.

(8) Total CDC Group and Agency Manpower Requirements. Figure D-9 summarizes the total CDC manpower (in man-years) required to support all T&E activities in FY 73 by all CDC action groups and agencies, based on addition of (1) through (7) above.

(9) The total CDC group and agency manpower requirements for FY 73 depicted in Figure D-9 can have no fixed level of confidence placed upon their validity based on standard statistical OR/SA or mathematical

FY 73 USER FIELD TEST MANPOWER REQUIREMENT

	<u>COMSG</u>	<u>PALSG</u>	<u>INCSG</u>	<u>CONFORG</u>	<u>TOTAL</u>	
	<u>MM</u>	<u>MM</u>	<u>MM</u>	<u>MM</u>	<u>MM</u>	<u>%</u>
ICTT	192	8	--	--	200	15%
JT	17	30		36	83	7%
FLDEXP	236	--	9	--	245	19%
MSFT/SFT	122	16	363		501	39%
TT/FE	131	89	44	--	264	20%
<hr/>						
Total Man-months	698	143	416	36	1293	100%
Total Man-years	58	12	35	3	108	
Total Per-	54%	11%	32%	3%		100%

Figure D-8

TOTAL CDC MANPOWER REQUIREMENTS
(In Man-years)

	<u>COMSG</u>	<u>PALSG</u>	<u>INCSG</u>	<u>CONFORG</u>	<u>TOTALS</u>
Identify Critical Issues	3.6	0.6	0.3	0.2	5.0
Review of CTP	3.6	0.6	0.3	0.2	5.0
Assist in EST/DST Plan	4.0	0.6	0.7	0.1	5.4
Participate in EST	21.8	6.2	0.6	0.1	28.7
Independent Evaluation	11.5	0.2	0.3	0.1	12.0
RMA Review of EST	--	21	--	--	21
<hr/>					
Developmental Test Subtotals	(44)	(30)	(2)	(1)	(77)
<hr/>					
User Field Tests Subtotals	58	12	35	3	108
<hr/>					
Total - All T&E (Percentages)	102 55%	42 23%	37 20%	4 2%	185 100%

Figure D-9

tools. The totals are no more reliable than the estimates made on any one test. The figures above were collected during this study for the purpose of comparing the group and agency requirements versus capabilities, identifying shortfalls, and allocating additional personnel resources to the subordinate commands to bring capabilities up to requirements through reductions in HQ CDC. This intended methodology was reevaluated during this study since group and agency capability to perform the estimated requirement could not be accurately determined for developmental tests.

(a) The total T&E requirement, 185 man-years in FY 73, is approximately 9.7% of the total group and agency authorized strength (1899). The total T&E requirement, 185 man-years in FY 73, is a significant 14.5% of the available "production" capability (1274 man-years) of all groups and agencies.

(b) Capability of CDC groups and agencies to meet all T&E requirements for FY 73 was impossible to determine since requirements may be overstated. But more importantly, T&E activities include the effort of much more than the limited number of identifiable "testers" in the CDC TDA. Each test or evaluation in which a CDC group or agency participates involves doctrinal personnel to develop field manuals and new concepts and tactics; organizational personnel to develop TOE's and new organizational concepts; and materiel personnel to determine performance, operational characteristics and standards against which the test may be run.

(c) If personnel become available due to a reduction of HQ CDC, the percentage of personnel spaces allocated to the subordinate groups should be in accordance with the percentages in Figure D-9.

ALLOCATION OF RESOURCES TO ACTION GROUPS

<u>COMSG</u>	<u>PALSG</u>	<u>INCSG</u>	<u>CONFORG</u>
55%	23%	20%	2%

Figure D-10

(d) No major new missions or functions have been assigned to CDC in the past year other than in T&E, which further supports the conclusion stated in (c) above.

(e) Since there is doubt as to the reliability of the manpower

requirements estimated above, only percentage figures will be used in the remainder of the study to reallocate HQ CDC personnel to groups and agencies.

d. HQ CDC T&E Functions, Manpower Requirements and Capabilities. There are four basic T&E functions which are currently being performed by HQ CDC. These are (1) staff supervision over the mission performance of CDEC by the Director of T&E; (2) preparation and management of T&E programs; (3) execution of staff and coordination responsibilities for all T&E activities for the CG CDC; and (4) Project Analysis of ICTT, JT, TT and FE and provision of assistance to the Test Directors in these tests for detailed planning, execution and reporting, through the provision of Test Support Cells. These functions will be discussed in paragraphs (1) to (4) below. There are also other major functions being performed by T&E Directorate which either should be tasked to other headquarters' elements or delegated to subordinate commands. These functions are discussed in Paragraph (5) below.

(1) Staff supervision over the mission performance of CDEC. This responsibility by the Director of T&E goes beyond normal staff procedures, particularly when the prime element exercising this action in the directorate is a small division of three officers (headed by a Colonel) monitoring a command of 2800 personnel commanded by a General Officer. CDC Reg 10-2 should delete this responsibility from the T&E Directorate mission statement.

(2) Prepare and manage T&E Programs. As discussed in Par 8a above, significant improvements have developed CDC Pam 71-12 into a viable and reliable program for all user field tests. Certain problem areas discussed at Appendix 6 must be resolved however. The management of CDC Pam 71-12 lies in the Plans and Programs Branch of T&E Directorate, while the MASSTER programming responsibility remains in the MASSTER Coordination Division of the T&E Directorate. Primary input to the EST program (being developed into CDC Pam 71-12) remains the responsibility of the MS Director. All of these responsibilities and programs can and should be consolidated into a single organization requiring about four professionals (one of which should be a civilian to provide continuity).

(3) Staff and Coordination. This function can be accomplished with a minimum number of personnel. However, there is a definite requirement for personnel in excess of those required by (2) above. The group commanders operating within CGM's would prepare and approve all CDC T&E actions and command positions which are not SAL items. Approximately, one-third of user field tests and one-tenth of DST/EST are SAL items. The estimated professional manpower requirement in HQ CDC for

this function is seven officers to include staff responsibility for the coordination and consolidation of comments for command positions on the CTP, EST, Independent Evaluation and all user field tests.

(4) Project Analysis and Test Support Cells. This function is an operational or production task and thus should not belong to a headquarters staff. This function was discussed in Par 4f and 5 above. CDC requirements to support CONARC (or other major Army command) Test Directors for ICTT, JT, TT, and FE are in addition to that effort required by proponent groups and agencies in developing test requirements (Step 1 of the testing sequence), developing test proposals (Step 2) and the RAE of test results (Step 8). The CDC manpower requirements for FY 73 for this task are 45 professional testers and these are detailed at Appendixes 16 and 17. T&E Directorate has the capability of supporting this requirement if brought up to full strength (there were 39 vacancies in the directorate as of 1 Feb 72). Analysis of the ICTT, JT, FE and TT workload for FY 74 and later indicates that manpower requirements fall off drastically from the FY 73 level to less than 30 personnel (See Appendix 16). This drop is due to a lack of definite requirements. Further test-by-test analysis and experience thus far in this new concept of providing "professional testers" to CONARC has led to the following findings:

(a) Group and Agency assistance is required for most tests. This was demonstrated in the FAAR ICTT (currently being planned) where the technical expertise and ability to define critical issues and requirements for the test had to be obtained from the ADA and COMSG. It is also apparent that the optimal cell composition for most small TT and FE would be a two-man team consisting of one "professional tester" and one group or agency "expert" in the area being tested.

(b) Guidelines can be arbitrarily established to regulate Test Support Cell size and composition as was done at Appendix 17. The complexity and scope of each test will determine the requirement. No cell should be larger than 14 personnel. The professional tester provides at least one, but normally no more than five personnel. The group and agency requirements are at least one and no more than five personnel for the largest test (primarily ICTT).

(c) ORSA, engineering or statistical support will be required during Project Analysis and on all large test cells and thus must be provided to the professional tester.

(d) The "best" Test Support Cell composition is as shown at Appendix 17 for each scheduled test. Addition of Appendix 17 requirements results in the following personnel requirements for FY 73:

FY 73 CDC GROUP REQUIREMENTS TO AUGMENT TEST SUPPORT CELLS

	<u>COMSG</u>	<u>PALSG</u>	<u>INCSG</u>	<u>CONFORG</u>	<u>GROUP TOTALS</u>
Personnel	16	4	1	0	21

Figure D-11

These requirements can be met within the current capabilities of T&E Directorate and thus these assets (21 spaces) should immediately be transferred to the groups or the SAG Field Offices which support the groups.

(e) Certain exceptions will always exist. The Test Support Cells for C5A and COMBAT HUNTER Joint Tests are already formed and will not require group or agency personnel. Tests such as these may require PCS personnel as needed or directed by DA. Certain tests such as C5A may require many personnel (C5A Evaluation Group currently has 11 personnel).

(f) HQ CDC T&E Directorate personnel, if reassigned, would assist in meeting other T&E requirements such as EST and Independent Evaluation.

(5) ORLL and VCOD Programs. These are two DA directed programs being managed by T&E Directorate which require one officer ... (MAJ) and one SFC. HQ CDC must retain these personnel if DA continues to require CDC participation in the programs.

(6) Minimal HQ CDC Personnel Requirements. There is a minimum requirement in HQ CDC for an OTE office of at least 17 personnel consisting of those shown in Figure D-12.

(7) The OTE Division in Figure D-12 is deemed capable of implementation when four conditions have been met:

(a) Pertinent T&E regulations and guidance -- by both DA and CDC -- are published. This requirement is discussed at Appendix 6.

(b) Detailed guidance, check lists and SOP must be developed to guide the systems directorates created at HQ CDC and all groups and agencies in the areas of critical issues, CTP, DST, EST, Independent Evaluation, and all user field tests.

(c) A Joint CDC/AMC/TECOM Memorandum of Agreement (MOA) is developed, published and supplemented at each board/agency location covering procedures for conduct of the DST and EST.

(d) Other HQ CDC Directorates are also reduced to systems divisions under DCSOPS in a Phase II Organization of HQ CDC.

DCSOPS OTE DIVISION

<u>Quantity</u>	<u>Position</u>	<u>Function</u>
1	06	Chief
7	Officers	T&E Staff and Coordination
3	Officers	T&E Program Management
1	Prof Civ	
1	04	ORLL and VCOD Programs
1	SFC	(This function need not be retained in T&E)
3	Clk Civ	Typing, Steno, Admin, Files
<hr/>		
17	Total	

Figure D-12

9. ALTERNATIVES FOR ACCOMPLISHING T&E RESPONSIBILITIES.

a. Alternative I (Large HQCDC T&E Element).

(1) Description. In this concept of operation the T&E Directorate has both staff and operational responsibilities. In essence it combines T&E functions of both T&E and MS Directorate under one head. These functions include planning, programing, budgeting, and RAE of all tests and evaluations to include the CTP, DST, EST and all user field tests. It includes responsibility for conducting Project Analysis and providing Test Support Cells for all ICTT, TT, FE, and JT. It provides a limited reduction in the size of the T&E Directorate and a limited increase in the action groups.

(2) Personnel strengths:

- (a) Decrease HQCDC MS Directorate by 2 personnel.
- (b) Delete 3 secretarial personnel from T&E Directorate.
- (c) Increase HQCDC C&D Directorate by 2 personnel for ORLL/VCOD Program functions.
- (d) Decrease HQ CDC T&E Directorate by 27 personnel to a total of 75.
- (e) Increase groups by 24 personnel as shown in Figure D-13.

ALTERNATIVE I - PERSONNEL CHANGES

	<u>COMSG</u>	<u>PALSG</u>	<u>INCSG</u>	<u>CONFORG</u>	<u>TOTALS</u>
T&E Personnel (non-OR/SA)	13	6	5	-	24

Figure D-13

<u>(3) Advantages</u>	<u>and</u>	<u>Disadvantages</u>
(a) Provides visibility, command emphasis and HQCDC point of contact for DA and other major Army commands.		(a) Places operational/production elements in a head-quarters staff.
(b) Centralizes test methodology and design for ICTT, FE, TT, and JT.		(b) Does not decrease personnel in NCR, thus 24 vacancies cannot be filled for 6 to 12 months.
(c) Provides flexibility to re-allocate resources if test priorities are changed.		(c) Does not support lead horse concept.

(d) Facilitates coordination and staff procedures.

(e) Provides limited additional user field test and EST capability to groups.

(d) Does not significantly improve capability to support DST, EST, and Independent Evaluation.

(e) Fragments OR/SA capability.

(f) Does not provide adequate OR/SA support to SAG or groups.

b. Alternative II (Maximum T&E Resources to groups).

(1) Description. In this concept of operation HQCDC T&E Directorate is reduced to a small coordinating staff under DCSOPS and all remaining resources and responsibilities are allocated to the groups.

(2) Personnel Strengths.

(a) Decrease HQCDC MS Directorate by 2 personnel.

(b) Delete 3 secretarial **spaces** from T&E Directorate.

(c) Decrease HQCDC T&E Directorate by 87 personnel to a total of 17 personnel in the OTE Division of DCSOPS. The 2 personnel in ORLL/VCOD Program Management can be placed in another division.

(d) Increase action groups by 84 personnel as shown at Figure D-14.

ALTERNATIVE II - PERSONNEL CHANGES

Until C5A Joint Test Terminates (March 1973):

	<u>COMSG</u>	<u>PALSG</u>	<u>INCSG</u>	<u>CONFORG</u>	<u>TOTALS</u>
PA & Test Support Cells (includes 13 OR/SA)	25	7	2	11	45
OR/SA Analysts	6	2	2	0	10
Other T&E Personnel	<u>16</u>	<u>6</u>	<u>6</u>	<u>1</u>	<u>29</u>
TOTALS	47	15	10	12	84

After C5A Joint Test Terminates:

	<u>COMSG</u>	<u>PALSG</u>	<u>INCSG</u>	<u>CONFORG</u>	<u>TOTALS</u>
PA & Test Support Cells (includes 13 OR/SA)	33	9	3	0	45
OR/SA Analysts	6	2	2	0	10
Other T&E Personnel	<u>16</u>	<u>6</u>	<u>6</u>	<u>1</u>	<u>29</u>
TOTALS	55	17	11	1	84

Figure D-14

(3) Advantages and Disadvantages

(a) Supports lead horse concept.	(a) Lacks visibility and a centralized T&E organization for ICIT and other user field tests.
(b) Provides capability of augmenting cells with CD officers if professional testers not required.	(b) Dissipates the professional tester and inhibits coordination. (COMSG, the major recipient, stated that the personnel would be assigned to agencies.
(c) Provides OR/SA support to groups.	(c) Fragments OR/SA capability.
(d) Decreases personnel in NCR.	(d) Lacks flexibility to reallocate resources when requirements shift between groups.
(e) Decrease size of HQCDC.	(e) Places proponent groups in position which has them developing test proposals, designing, conducting, and reporting tests and then conducting evaluation of reports the proponent group developed.
(f) Decreases TDY costs.	
(g) Provides significant T&E assets to groups for EST and Independent Evaluation.	

(c) Alternative III (SATEG).

(1) Description. In this concept of operations HQCDC T&E Directorate is reduced to a small coordinating staff under DCSOPS, Project Analysis, and Test Support Cells are provided to SAG, and a limited number of other T&E are provided to groups.

(2) Personnel Strengths.

- (a) Decrease HQCDC MS Directorate by 2 personnel.
- (b) Delete 3 secretarial spaces from T&E Directorate.

(c) Decrease HQCDC T&E Directorate by 84 personnel to a total of 17 personnel in the OTE Division of DCSOPS. The personnel in ORLL/VCOD Program Management can be placed in another division.

(d) Increase SATEG and groups by 84 personnel as shown at Figure D-15.

ALTERNATIVE III - SATEG

	<u>SATEG</u>	<u>COMSG</u>	<u>PALSG</u>	<u>INCSG</u>	<u>CONFORG</u>	<u>TOTALS</u>
OR/SA Analysts	10	0	0	0	-	10
PA & Test Support Cells (includes 13 OR/SA)	45	-	-	-	-	45
Other T&E Personnel	<u>2</u>	<u>14</u>	<u>6</u>	<u>6</u>	<u>1</u>	<u>29</u>
TOTALS	57	14	6	6	1	84

Figure D-15

(3) Advantages	and	Disadvantages
(a) Centralizes test methodology and design for ICTT, FE, TT, JT.		(a) Places two separate missions on one organization, one of which may be executed to detriment of the other.
(b) Provides flexibility to reallocate resources if test priorities change.		(b) Does not decrease personnel in NCR, thus most vacancies cannot be filled for 6 to 12 months in SATEG unless located at Leavenworth where there are no facilities.
(c) Decreases size of HQCDC.		(c) Does not support lead horse.
(d) Provides limited additional T&E capability to groups.		(d) Does not significantly improve capability to support DST, EST, and Independent Evaluation.
(e) Centralized OR/SA capability.		(e) Provides no organic OR/SA support to the groups.

d. Alternative IV (CDEC).

(1) Description. In this concept of operations T&E Directorate is reduced to a small coordinating staff under DCSOPS. Project analysis and Test Support Cells are given to CDC, OR/SA personnel are provided to SAG Field Offices and limited T&E personnel are provided the groups.

(2) Personnel Strengths.

(a) Decrease HQCDC MS Directorate by 2 personnel.

(b) Delete 3 secretarial spaces from T&E Directorate.

(c) Decrease HQCDC T&E Directorate by 84 personnel to a total of 17 in OTE Division of DCSOPS. The 2 personnel in ORLL/VCOD Program Management can be placed in another division

(d) Increases CDEC, SAG and groups by 84 personnel as shown in Figure D-16.

ALTERNATIVE IV - CDEC

	<u>SAG</u>	<u>CDEC</u>	<u>COMSG</u>	<u>PALSG</u>	<u>INCSG</u>	<u>CONFORG</u>	<u>TOTALS</u>
OR/SA Analysts	10	-	0	0	0	-	10
PA & Test Support Cells (includes 13 OR/SA)	-	45	-	-	-	-	45
Other T&E Personnel	<u>2</u>	<u>-</u>	<u>14</u>	<u>6</u>	<u>6</u>	<u>1</u>	<u>29</u>
TOTALS	12	45	14	6	6	1	84

Figure D-16

(3) Advantages

and Disadvantages

(a) Centralizes test methodology and design for ICTT, FE, TT JT.	(a) May adversely effect either performance of FLDEXP or the Test Support Cells, due to priority of one function over the over.
(b) Centralizes all professional testors (user tests and FLDEXP) in CDEC.	(b) Delays tasking and coordination due to the time-distance separation.
(c) Provides flexibility to re-allocate resources if test or experimentation priorities change.	(c) Increases TDY costs.
(d) Provides for immediate capability to do PA and provide Test Support Cells.	(d) Does not support the lead horse
(e) Provides CDEC flexibility to allocate resources and "types" of personnel from more scientific FLDEXP to more subjective user field tests or vice-versa.	(e) Provides no organic OR/SA support to the groups.
	(f) Does not significantly improve capability to support DST, EST and Independent Evaluation.

- (f) Reduces size of HQCDC.
- (g) Reduces personnel in NCR.
(10 of the 12 SAG Personnel are also out of NCR assigned to Field Offices)
- (h) Separates professional testor from the proponent who develops test proposals and conducts of test test results.
- (i) Provides necessary facilities.
- (j) Provides limited additional user field test capability to groups.

10. ANALYSIS OF ALTERNATIVES.

a. Based on consideration of all factors involved it appears that alternative IV offers the greatest number of significant advantages. This choice provides the greatest probability of successfully conducting the ICTT, JT, TT, and FE responsibilities specifically assigned by DA and for which CDC received 45 personnel. It consolidates the OR/SA support into one element of CDC (less 10 new civilian OR/SA assigned CDEC). It provides maximum flexibility and utilization of limited OR/SA assets. OR/SA for groups and agencies can be obtained from within their resources through redistribution (see Annex C) of existing OR/SA spaces and personnel assigned. SAG augmented by these 12 spaces (including 10 professional civilians) can allocate OR/SA support to the highest priority test, as determined by HQ CDC. Alternative IV also significantly reduces HQCDC and the number of civilian spaces in NCR. CDEC has the expertise, facilities, and resources to assume this new mission immediately. Alternative I was considered completely unacceptable for many reasons (see paragraph a above). Alternative III was also considered unacceptable since the mission of providing Test Support Cells to CONARC is deemed incompatible with SAG's current mission. Further Alternative IV does not decrease personnel spaces in the NCR and thus the civilians could not be hired for 6 to 12 months by SAG. Alternative II has a great many advantages including support of the lead horse concept to the maximum degree. It also provides significant resources to assist groups and agencies to plan for EST, participate in EST, and conduct an Independent Evaluation of test results and new materiel systems. However, Alternative II, due to the desires of COMSG, and facility limitations at Fort Leavenworth, would distribute the Test Support Cells and other personnel to agencies. This is considered the worse possible way to provide "test experts" to CONARC (or other major Army commands) participating in ICTT, TT, FE, and JT. The workload at agency level is not constant and therefore experienced personnel would not be available when the next test occurred at the same agency. These personnel would ultimately be "lost" under Alternative II much in the same manner as the previous 171 personnel assigned to CDC in 1966 for the service test mission.

b. Considering (1) the recent guidance of the CGCDC on delay in Phase II HQCDC Reorganization Plans (See Annex E), (2) the recommendations of the COA Study of 1 Feb 72 and the CGCDC reply to the COA on 18 Feb 72, (3) the lack of completed CGM (See Annex B), (4) the unfulfilled conditions listed at paragraph 8d(7) above, and (5) other ongoing CDC studies/actions, the immediate implementation of Alternative IV is not deemed advisable. Alternate IV will thus be considered the ultimate goal of a Phase II Reorganization of HQ CDC.

c. Considering paragraph b above an interim Phase I T&E Organization is recommended. This organization:

- (1) Supports the findings of this study.
- (2) Supports a "medium lead horse concept".
- (3) Supports a medium sized CDC Headquarters.
- (4) Does not conflict with the desires of the CG CDC or possible implementation of the COA Study recommendations.

d. The Phase I concept is identical to alternative IV except that 14 personnel scheduled for distribution to CDC action groups will be retained at HQCDC in a 29 man T&E Division in DCSOPS. OR/SA assets, Test Support Cells and maximum T&E personnel spaces will be released from HQCDC to SAG field offices, CDEC (or the Army Test Command if the COA Study is approved) and action groups, respectively. Phase II (or the complete Alternative IV) should be adopted as soon as practical, although specific dates are not recommended in the implementation schedule contained at Chapter 7 to this Study.

11. FINDINGS, CONCLUSIONS AND RECOMMENDATIONS:

a. A Summary of Annex D is contained at para 5.1, Chapter 5, Volume I of this Study.

b. Findings are listed at para 5.2, Chapter 5, Volume I.

c. Conclusions are listed at para 5.3, Chapter 5, Volume I.

d. Recommendations are listed at para 5.4, Chapter 5, Volume I.

(1) Phase I recommended manpower changes are summarized at Figure 7, Chapter 5, Volume I.

(2) Phase I recommended organization, mission and functions of the HQCDC DCSOPS T&E Division are shown at Figure 8, Chapter 5, Volume I.

(3) Phase II recommended manpower changes are summarized at Figure 9, Chapter 5, Volume I.

(4) Phase II recommended organization, mission and functions of the HQCDC DCSOPS OTE Division are shown at Figure 10, Chapter 5, Volume I.

(5) Detailed TDA changes necessary to implement both Phases I and II are at Appendix 18 to this Annex.

Appendixes

1. Definitions
2. Interface with Developmental and User Tests
3. CDC Responsibilities in Test Plans
4. CDC Responsibilities in Test Reports
5. OTE for Major Systems
6. CDC Regulations, Guidance and Procedures
7. EST Schedule
8. EST Recapitulation
9. User Field Test Schedule
10. Manpower Requirements for EST Planning
11. Manpower Requirements for Conduct of EST
12. Manpower Requirements for Independent Evaluation
13. Manpower Requirements for EST Summarized
14. User Field Test Schedule and Manpower Requirements
15. User Field Test Manpower Planning Factors
16. FY 73-74 User Field Test Manpower Requirements
17. Test Support Cell Manpower Requirements
18. Detailed TDA Changes Recommended

APPENDIX 1 TO ANNEX D

DEFINITIONS

1. **Combat Evaluation.** A field evaluation conducted in actual combat operations.
2. **Coordinated Test Program (CTP).** A planning document which formalizes the all inclusive testing activities relating to a development project. It is evolutionary in nature, sectionalized by major test, and developed and maintained by the developing on an item or system basis. It is coordinated with appropriate agencies and approved by the HQDA (CRD). Critical issues and questions to be answered/addressed during the test program will be identified as early in the life cycle of the system as practical, stated in the CTP and refined throughout the development and acquisition process.
3. **Critical Issues .** Critical issues and questions are those technical, performance, operational, doctrinal, logistical, training, organizational, and threat questions which have the potential to cause future developmental or deployment problems for the system and which should be resolved by developmental and/or user testing prior to the full production/deployment decision.
4. **Development Concept Paper (DCP).** A summary top-management document for the Secretary of Defense that presents the rationale for starting, continuing, or stopping a development program at each critical decision point. It identifies the issues in each decision and assesses the important factors, including threat, risks, full military and economic consequences, and pros and cons of each alternative. Once the Secretary of Defense has approved the DCP, it is a "contract" between the Secretary of Defense and the implementing Service Secretary to define the latitude of the Service in managing the program within the thresholds of cost, performance, and schedule that have been mutually agreed upon.
5. **Developmental Suitability Test (DST).** A developmental test conducted to examine the relative merits of competing systems and to provide an early determination of potential military worth of new systems. It is characterized by controlled conditions and on the presence of hypotheses and criteria in the test plan. It may be a competitive test to determine which agency is best qualified to develop the system.

6. Developmental Test. A generic term including all tests done by or for the developer, as opposed to user field tests (which are performed by or for the user). It includes engineer design tests, contractor demonstrations, developmental suitability tests, research and development acceptance tests, engineering tests, expanded service tests, check tests, preproduction tests, and initial production tests. These types of tests are all defined in AR 70-10. Developmental test results provide quantified measurements and evaluations of equipment performance against design and technical performance standards based on the characteristics stated in the materiel need.

7. Evaluation. The process which relies on prestated hypotheses and criteria, data collected under controlled field test conditions, and a combination of military judgment, historical data and analyzed data to determine the military worth, operational effectiveness, and suitability for Army use of new or proposed materiel systems.

8. Expanded Service Test (EST). An extensive developmental test conducted by the developer's test command with troops representative of those who will operate the equipment, operated under simulated tactical conditions or conditions similar to those expected in the area(s) of intended operational use. The purpose is to determine whether or not the materiel is operationally effective and suitable for Army use by: (1) measuring to what degree the materiel meets performance standards specified in the requirements document; (2) testing and evaluating the training package and maintenance test package; and (3) testing a small tactical unit equipped with the materiel by means of a controlled field exercise to provide data on the overall item/unit effectiveness or military worth as input to the evaluation process. Consideration must be given to verify doctrine, organization, and tactics, basis of issue, logistical support, and training requirements.

9. Field Evaluation (FE). A user field test conducted by TOE troop units under normal operating conditions over an extended period of time for the purpose of evaluating existing modified or proposed doctrine, organization, materiel concepts, tactics, and techniques. It is an examination of over mere stated hypotheses with primary reliance on the use of subjective data; with few independent (input) variable controlled and many dependent (output) variables measured as strictly as possible. Field evaluations are characterized by: (1) absence of a scenario; (2) realism taking precedence over control; (3) execution over a long period of time; (4) data collection by independent observers, interviews and unit documentation; and (5) extensive reliance on use of subjective data and military judgment.

10. Field Experiment (FLDEXP). A user field test conducted in the field with military personnel and equipment under simulated operational conditions in a carefully controlled and instrumented environment to obtain objective, quantitative data on organizational, doctrinal, and materiel concepts, or data on organizational and man-machine system performance. Field experiments are characterized by: (1) rigid control of independent (input) variables; (2) exact quantitative measurement of dependent (output) variables; (3) limited scope; (4) short execution times; (5) primary data collection by instrumentation; and (6) many repetitions to insure quantifiable validity and reliability.

11. Independent Evaluation. This evaluation is that process which extracts from scientifically based data, the assessment of military worth, operational effectiveness and suitability of a proposed materiel system. This assessment is prepared by the user (Center Team Commander) and the user's representative (USACDC) on each major materiel system prior to the full production/deployment decision based on a combination of military judgment and experimental, historical and analytical; particularly, that data resulting from the OTE conducted during the EST and ICTT.

12. In-Process Review (PR). A review of developmental materiel item/system conducted at critical points in the development cycle for the purpose of evaluating the operational effectiveness and suitability for Army use, accomplishing effective coordination and facilitating proper and timely decisions bearing on the future course of the item/system. Normally, voting members are USAMC, USACDC, CONARC, and USALDSRA. The members will review test data and make recommendations on the future progress of the development program.

13. MASSTER Field Test. A user field test conducted by MASSTER including the Materiel Field Test (MFT), Systems Field Test (SFT) and, Materiel Systems Field Test (MSFT).

14. Materiel Field Test (MFT). A MASSTER field test to evaluate the potential of a hardware item/system early in the material development cycle. It is conducted to provide information on which to base decisions on the pace of development and/or changes in materiel configuration that could be made to improve the item's utility. The MFT also assesses, to a limited degree, the impact of the introduction of new hardware on concepts, doctrine, organization, training, and logistics.

15. Materiel/Systems Field Test (MSFT). A combination of the MFT and SFT into one MASSTER field materiel and systems test requirements can be satisfied by one test.

16. Military Potential Test (MPT). A user field test of a nondevelopmental item, component, or system which is conducted for the purpose of determining whether the materiel or equipment has military potential to satisfy a stated requirement.

17. Operational Test and Evaluation (OTE). The continuing assessment of materiel from inception through production by operational personnel. It is not a specific test but includes the test and evaluation of a materiel system under actual or simulated operational conditions by or for the user to aid in determining the system's operational effectiveness and in validating the related organization, doctrine, tactics, basis of issue, training requirements, and logistical support. The goal of the operational test and evaluation process is an independent evaluation by the user of an item's acceptability for Service use prior to a major production decision. Specific tests which are normally required to include OTE are the EST and ICTT.

18. Suitability. A subjective determination that developmental materiel does or does not meet minimum essential standards prerequisite to satisfactory field service use. The judgment may be based on the presence or absence of uncorrectable materiel deficiencies, and/or the number and assessed importance of correctable/uncorrectable shortcomings. The declaration of suitability/unsuitability is a critical matter in the materiel development life cycle which requires deliberate and careful consideration.

19. System Development Plan (SDP). A plan prepared early in the development cycle of major materiel systems and used as one of the justification documents which are to be submitted to the Secretary of Defense to secure approval for a project. The SDP will contain narrative summaries of the technical goals and of the detailed supporting plans (including the CTP) necessary to outline the proposed program to satisfy the development objective. After the project is approved, the SDP is maintained and expanded by the responsible participating agencies under the supervision of the project manager and is used as a control and reporting document (AR 70-27).

20. Systems Field Test (SFT). A MASSTER field test to experiment with and evaluate new materiel concepts, doctrine, and organizations to assess the contribution/impact of a given concept, doctrine, organization or hardware system of the Land Combat System. The SFT will focus on measuring the change in unit effectiveness which is brought about by the hardware, doctrine, concepts or organization of the combat elements under study. Small SFT's normally will be conducted early in the development cycle, while large SFT's will be conducted later in the cycle to confirm the result of studies, models, and small SFT's.

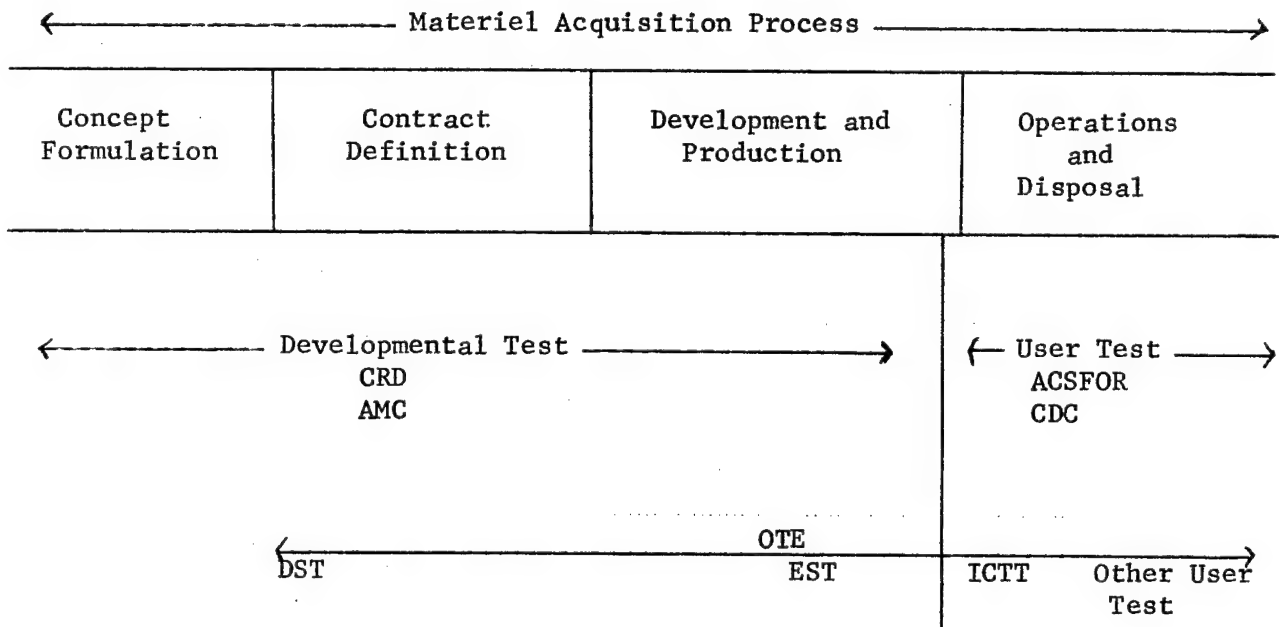
21. Test. A generic term including all developmental and user field tests.

22. Troop Test (TT). A user field test conducted by TOE troop units and simulated combat conditions for the purpose of evaluating existing, modified, or proposed materiel concepts, organization, tactics and techniques. It is an examination of over mere stated hypotheses, with as many independent (input) variables as possible controlled, and with a few dependent (output) variables measured as strictly as possible; primary reliance is placed on objective data as opposed to subjective data. Troop tests are characterized by: (1) some flexibility in unit activities accepted within a detailed scenario; (2) control taking precedence over realism; (3) execution over a relatively short time period; (4) primary data collection by independent observers, instrumented recordings, and interviews; and (5) multiple data collection periods. The ICTT will be designed to conform to these criteria.

23. User Field Test. A generic term including all tests done by or for the user, as opposed to developmental tests (which are performed by or for the developer). It includes MASSTER field tests, field experiments, operational tests, portions of the expanded service tests, combat evaluations, joint tests, troop tests, field evaluations, field surveys, intensified conformationary troop tests and military potential tests. These types of tests: (1) establish the workability and effectiveness of materiel concepts, organizations, doctrine, tactics and techniques designed to support the Land Combat System and/or the Army in the Field and, (2) demonstrate the operational performance capabilities of selected materiel items of Army equipment in the hands of the user in combat or simulated combat conditions.

APPENDIX 2 TO ANNEX D

INTERFACE OF OTE WITH DEVELOPMENTAL AND USER TESTS



CDC-Test Plan Approval
ACSFOR-Independent Eval.

CDC-Plan, Program, Budget
ACSFOR-Approve

APPENDIX 3 TO ANNEX D

CDC RESPONSIBILITIES IN DEVELOPMENTAL AND USER TEST PLANS

<u>TEST TITLE</u>	<u>PREPARED BY</u>	<u>COORD WITH CDC</u>	<u>APPROVED BY</u>
DST, EST	TECOM	Yes	CDC
ET, CT, IPT	TECOM	Yes	TECOM
EDT	AMC	Yes	AMC
CD, RDAT, PPT	AMC	Not Normally	AMC
ICTT, TT, FE, JT	OTP-CDC	Yes	DA
	DTP-Major Army Cmd	Yes	CONARC
	Concept Test Pln-CDC	Yes	CDC/MASSTER
MSFT, SFT	DTP-MASSTER	Yes	CDC/MASSTER
Fld Exp	CDEC	Yes	CDC/DA

APPENDIX 4 TO ANNEX D

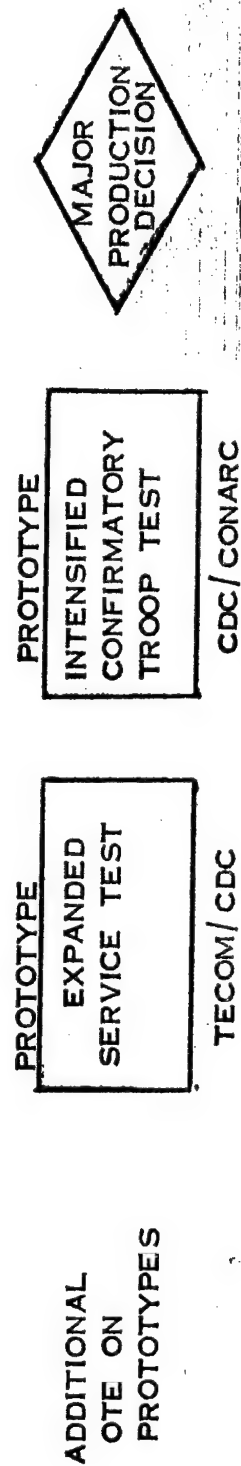
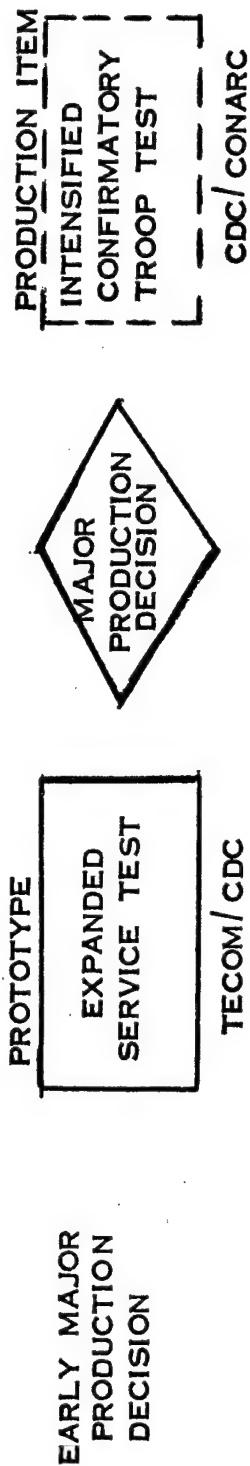
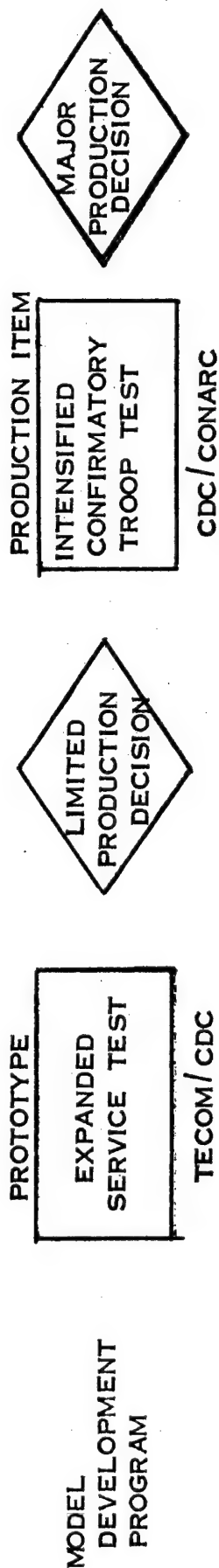
CDC RESPONSIBILITIES IN DEVELOPMENTAL AND USER TEST REPORTS

<u>TEST TITLE</u>	<u>PREPARED BY</u>	<u>CDC RESPONSIBILITY</u>
DST, EST	TECOM	Independent Evaluation
ET	TECOM	Eval of TECOM Test Rpt
CT, IPT	TECOM	*Eval of TECOM Test Rpt
EDT, RDAT, PPT, CD	AMC	Normally no review required
ICTT, TT, FE, JT	Major Army Cmd	Eval of Test Report
Fld Exp	CDEC	Eval of Test Report
MSFT, SFT	MASSTER	Eval of Test Report

*If required because of deficiencies discovered in ET, EST.

EARLY OPERATIONAL TEST & EVALUATION FOR MAJOR SYSTEMS

APPENDIX 5 TO ANNEX D



APPENDIX 6 TO ANNEX D

CDC REGULATIONS GUIDANCE AND PROCEDURES

Current regulations, guidance, and procedures for participation by CDC groups and agencies in all facets of developmental and user field tests, to include the critical issues, the CTP and the Independent Evaluation are very limited, out-of-date and are in need of drastic revision. The only exceptions to this statement are field experimentation activities. In summary the following findings describe the status of certain areas and/or documents which need revision.

a. The draft CDC letter, CDCMS-P, USACDC Participation in the Expanded Service Test, was dispatched to all CDC elements on 5 November 1971 to provide interim guidance to CDC groups and agencies and secure their comments. This letter must be prepared in final and published as soon as possible.

b. AR 70-10 (T&E During Development and Acquisition of Materiel) has been in effect since July 1971; however no CDC supplement has been prepared nor has CDC Reg 71-9 (EST Plans and Reports) been revised to incorporate changes dictated by AR 70-10.

c. AR 71-3 (User Tests) is dated 1968 and is completely inaccurate and out of date. Although the DA letter of 30 November 1971 has published interim guidance, many procedures and other CDC responsibilities must be provided in a needed revision of AR 71-3.

d. CDC Reg 71-8 (Troop Tests and Field Evaluations) is out of date and is in need of revision. The CDC letter dated 29 December 1971, Conduct of OTE, has provided interim guidance to CDC groups and agencies but many details and procedures need to be developed by revision of CDC Reg 71-8 as soon as possible.

e. CDC Reg 71-4 (MASSTER Testing) was superseded by the STANO CGM but is in need of revision and republication to describe in detail the new procedures currently contained in the CDC/MASSTER Memorandum of Agreement for conduct of MSFT, SFT, and MFT. T&E Directorate is now preparing a draft of this regulation.

f. A great number of procedures and responsibilities for preparation and publication of CDC Pam 71-12 (Five-Year User Field Test and Field Experimentation Program) have been placed in effect during 1971 which have greatly improved the utility, flexibility, format, reliability, and readability of the former CDC Pamphlets 71-12 and 71-15. These procedures need to be explained and guidance provided CDC groups and agencies in CDC Reg 71-8 as soon as possible.

g. DA (OACSFOR) is preparing a new T&E regulation which will govern general policies and responsibilities for both AR 70-10 and AR 71-3 (both of which will continue in effect and contain more detailed instructions).

h. CDC should prepare one regulation which will govern CDC participation in all areas of T&E to include critical issues, the CTP, developmental tests, Independent Evaluations, and user field tests. Such a regulation would supersede CDC Regulations 71-4, 71-7, 71-8, and 71-9 and the CDC letters of 5 November and 29 December 1971.

i. The CORG Methodology Guide for Conduct of Troop Tests and Field Evaluations is also out of date and inaccurate. Its contents should be revised and it should become only one CDC pamphlet in a series of CDC Methodology pamphlets to guide action officers throughout CDC groups, agencies, and commands in the design, preparation, planning, budgeting, and RAE of:

- (1) Field Experiments (replacing the Experimentation Manual).
- (2) Troop Tests (replacing in part both the CORG Methodology Guide and CDC Reg 71-8).
- (3) Field Evaluations (also replacing in part the CORG Methodology Guide and CDC Reg 71-8).
- (4) ICTT (to explain detailed CDC procedures in this new type of test).
- (5) DST/EST (to explain detailed CDC procedures).
- (6) CTP and critical issues.

APPENDIX 7 TO ANNEX D

FY 723 - 752 EST SCHEDULE

1. Classified CONFIDENTIAL and therefore withdrawn from report.
2. Copies of this Appendix are available in T&E Directorate.

APPENDIX 8 TO ANNEX D

EST RECAP BY GROUP

GROUP	AGENCY	FY 72	FY 73	FY 74	TOTALS	%
COMS	INF	8	12	7	27	23
	ARM	4	4	3	11	9
	FLD ARTY	13	5	3	21	18
	AD	4	3	0	7	6
	ENGR	11	9	3	23	20
	CBR	8	1	2	11	9
	MP	1	6	1	8	7
	AVN	3	3	3	9	8
	TOTAL	52	43	22	117	76.5
PALS	Sup	3	4	3	10	53
	Trans	1	0	0	1	5
	Maint	6	2	0	8	42
TOTAL		10	6	3	19	12.0
INCS	CE	3	3	2	8	80
	INT	1	1	0	2	20
	TOTAL	4	4	2	10	6.5
CONFOR TOTAL	Spec Opns	1	3	1	5	72
	Nuc	1	1	0	2	28
	TOTAL	2	4	1	7	4.5
GRAND TOTAL		68	57	28	153	100

APPENDIX 9 TO ANNEX D

FY 723 - 752 USER TEST SCHEDULE AND MANPOWER
REQUIREMENTS (MAN-MONTHS)

1. Classified CONFIDENTIAL and therefore withdrawn from report.
2. Copies of this Appendix are available in T&E Directorate.

APPENDIX 10 TO ANNEX D

CDC LEVEL OF EFFORT IN EST PLANNING
(IN MAN MONTHS)

GROUP	3/FY 72	4/FY 72	1/FY 73	2/FY 73	3/FY 73	4/FY 73	1/FY 74	2/FY 74	3/FY 74	4/FY 74
COMS	58	32	20	4	4	21	16	9	1	0
PALS*	1	2	0	4	3	0	1	0	0	0
INCS	1	2	2	2	2	1	1	1	0	0
CONFOR	.1	.3	.3	.4	.5	0	0	0	0	0
TOTAL	60.1	36.3	22.3	10.4	9.5	23	18	10	1	0

*Figures do not include RMA support; this subject will be discussed separately.

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APPENDIX 11 TO ANNEX D

CDC LEVEL OF EFFORT IN EST EXECUTION
(IN MAN MONTHS)

GROUP	3/FY 72	4/FY 72	1/FY 73	2/FY 73	3/FY 73	4/FY 73	1/FY 74	2/FY 74	3/FY 74	4/FY 74
COMS	58	81	50	63	93	56	45	39	54	33
PALS*	2	10	27	15	14	19	3	9	1	0
INCS	4	4	2	2	1	2	2	2	2	2
CONFOR	.4	.3	0	.3	.2	.5	.5	.2	0	0
TOTAL	64.4	95.3	79	80.3	108.2	77.5	50.5	50.2	57	35

*Figures do not include RMA support; this subject will be discussed separately.

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APPENDIX 12 TO ANNEX D
CDC LEVEL OF EFFORT IN EST EVALUATION
(IN MAN MONTHS)

GROUP	3/FY 72	4/FY 72	1/FY 73	2/FY 73	3/FY 73	4/FY 73	1/FY 74	2/FY 74	3/FY 74	4/FY 74
COMS	0	3	25	2	6	105	19	2	5	18
PALS*	0	0	2	0	0	0	0	2	0	0
INCS	0	0	3.6	0	0	0	4	0	0	1
CONFOR	0	.3	0	0	0	.4	1	0	0	0
TOTAL	0	3.3	30.6	2	6	105.4	24	4	5	19

*Figures do not include RNA support; this subject will be discussed separately.

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APPENDIX 13 TO ANNEX D

TOTAL ESTIMATE OF EST MANPOWER REQUIREMENTS

(in man-months)

GROUPS	FY 72	FY 73	FY 74	TOTALS	PERCENTAGE
COMS	232	449	241	922	85
PALS	15	84	16	115	10.6
INCS	11	19	15	41	3.8
CONFOR	1.5	3	2	6.6	.6
TOTAL	259.5	555	274	1088.5	100.00

APPENDIX 14 TO ANNEX D

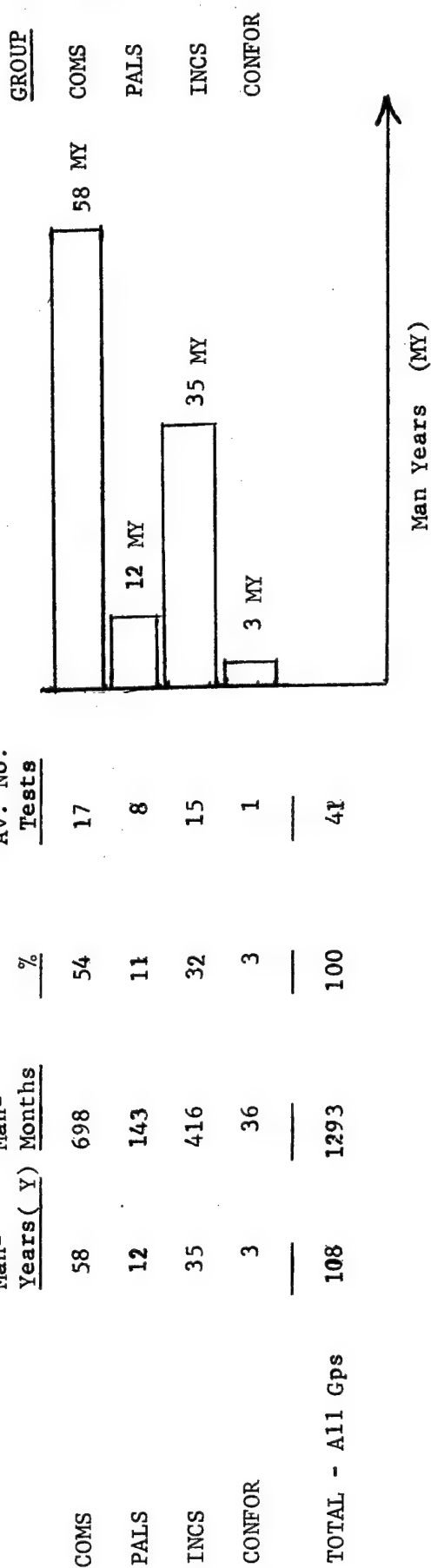
FY 73 MANPOWER ESTIMATES: USER FIELD TESTS

GROUP	FY 731		FY 732		FY 733		FY 734	
	MM	%	MM	%	MM	%	MM	%
COMS	183	52	171	51	162	52	182	62
PALS	36	10	49	15	34	11	24	8
INCS	122	34	101	30	106	34	87	30
CONFOR	13	4	14	4	9	3	0	0
TOTAL - All Gps	354	100	335	100	311	100	293	100

Av. No.
Tests

%

Man-
Years (Y) Months

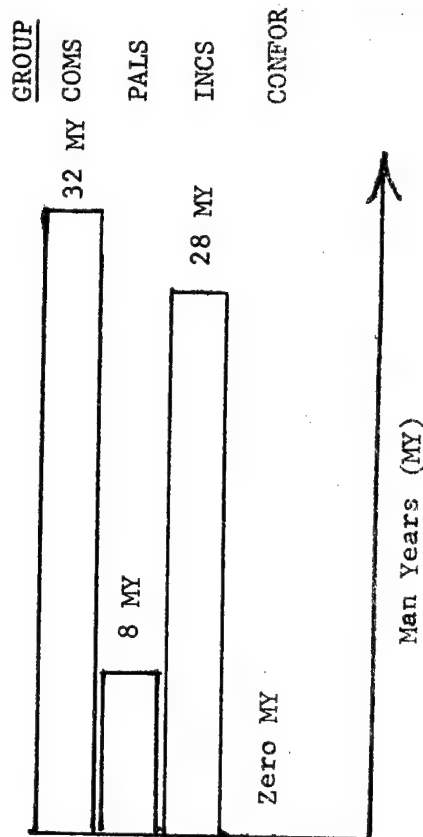


APPENDIX 14 TO ANNEX D (continued)

FY 74 MANPOWER ESTIMATES: USER FIELD TESTS

GROUP	FY 741		FY 742		FY 743		FY 734	
	MM	%	MM	%	MM	%	MM	%
COMS	137	52	117	48	67	35	56	43
PALS	28	11	41	17	34	18	7	6
INCS	100	37	85	35	91	47	66	51
CONFOR	0	0	0	0	0	0	0	0
TOTAL - All Gps	265	100	243	100	192	100	129	100

GROUP	Man- Years (MY)		Man- Months	%	Av. No. Tests
	Years	Months			
COMS	32	377	377	45	12
PALS	8	110	110	44	6
INCS	28	342	342	41	12
CONFOR	0	0	0	0	0
TOTAL - All Gps	68	829	829	100	30



APPENDIX 15 TO ANNEX D

SATE Study Group Man-Power Planning Chart For All User Tests

(In Man-Months)

		Quarters (3-months)						
Test/Experiment Size		T-4	T-3	T-2	T-1	Test Qtr	T+1	Total
Large								
	Total	15.3	15.3	11.2	11.2	12.5	14.2	79.7
Medium								
	Total	9.0	9.0	5.3	5.3	6.8	8.5	43.9
Small								
	Total	4.7	4.7	3.1	3.1	4.9	5.2	25.7

1. These planning figures will be used by the SATE Study Group to provide estimates for all scheduled tests/experiments in FY 723-752 for all CDC Groups.

2. Further, it will be assumed that 25% of this effort is done in the Group's T&E Directorates, 15% in Group Headquarters Staff and Coordinator, and 60% in either the proponent agency or the proponent directorate of the Headquarters in the event a proponent agency is not designated.

3. In the event planning is scheduled to start prior to T-4, then one-half of those figures shown above will be used, and in the event RAE continues past T+1, then one-half of those figures shown above will be used.

PROJECT ANALYSIS AND OTE CELL PERSONNEL REQUIREMENTS FOR USER TESTS
(IN # PERSONNEL)

	FY 72				FY 73				FY 74				FY 75	
	3	4	1	2	3	4	1	2	3	4	1	2	1	2
CONFOR														
Total Cell Rqmts	11	11	11	11	5									
Gp/Agcy Rqmts	-	-	-	-	-	-	-	-	-	-	-	-	-	-
PALS														
Total Cell Rqmts	4	7	10	10	11	11	12	12	12	4				
Gp/Agcy Rqmts	2	3	3	3	4	5	6	6	6	2				
INCS														
Total Cell Rqmts	2	2	3	3	4	2	3	3	4					
Gp/Agcy Rqmts	1	1	1	1	2	1	1	1	2	2				
COMS														
Total Cell Rqmts	15	33	44	43	47	49	44	23	17	12				
Gp/Agcy Rqmts	3	8	13	17	18	17	16	9	7	6				
TOTAL														
Total Cell Rqmts	32	53	68	67	67	62	59	38	33	20				
Gp/Agcy Rqmts	6	12	17	20	24	23	23	16	15	10				
Prof. Test Rqmts	26	41	51	47	43	39	36	22	18	10				

AVERAGE FY 73 PERSONNEL REQUIREMENTS

	Total Cell Rqmts	Percentage	Gp/Agcy Rqmts	Percentage	Prof Testor Rqmts	Percentage
*CONFOR	6	9	0	0	6	13
PALS Gp	11	17	4	19	7	16
INCS	3	5	1	5	2	4
COMS	46	69	16	76	30	67
TOTAL	66	100	21	100	45	100

*CONFOR has no requirement for OTE cells other than the C5A. Any consideration of the C5A Evaluation Group should assign this cell with the majority of the other cell personnel and place this group temporarily OPCON of CONFOR or HQCDC. These 11 spaces will provide test planning flexibility in March 1973 when C5A terminates.

APPENDIX 17 TO ANNEX D

OTE CELL PERSONNEL REQUIREMENTS
(In # of Personnel)

TYPE TEST	TEST TITLE	CY 72			CY 73			CY 74		
		FY 72		FY 73		FY 74		FY 75		
JT, C5-A	USAF/CONARC*	3	4	1	2	3	4	1	2	
		11	11	11	5					
FE, TASS	USAREUR	2/1	2/1	2/1	2/1					
ICTT, FAAR	CONARC	4/2	4/2	4/2	4/1					
		2/1	2/1	2/1						
FE, Maint Mgmt	USAREUR	2/1	2/1	2/1						
ICTT, I-HAWK	CONARC	2/1	14/5	14/5	7/3					
JT, OSDOC II	USN/CONARC	2/1	3/1	5/2	5/2	3/1				
ICTT, DRAGON	CONARC	1	3/1	5/2	14/5	14/5	10/3			
ICTT, M60A2	CONARC*	1	3/1	5/2	10/3	10/5	10/5			
ICTT, LANCE	CONARC	1	1	5/2	5/2	14/5	14/5			
FE, DECAPCHUTE	CONARC		1	1	1	2/1	2/1			
TT, Grnd Mobility	CONARC*		1	3/1	5/2	6/2	6/2			
FE, STANO PhII	USAREUR		.5	.5	1/2	1/2	1/2	1/2	1/2	
FE, STANO Ph III	USAREUR		.5	.5	1/2	1/2	1/2	1/2	1/2	2/1
FE, NMC	Unk		1	1	2/1	2/1	2/1	2/1	2/1	
FE, CS3	USAREUR		1	1	2/1	2/1	2/1	2/1	2/1	

APPENDIX 17 TO ANNEX D (continued)

[illegible]

LECTURE: Z/X:

$$X = \text{Total OTE Cell Count}$$
$$\bar{y} = \text{GP/Agency Control Point}$$

WALTON

Planning for Effective Reporting

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APPENDIX 18 TO ANNEX D

TDA CHANGES

1. MS DIRECTORATE LOSSES FROM:

<u>PH</u>	<u>PARA</u>	<u>LINE</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>	<u>UNIT</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>
I	23	02	05	42162	AR	CDEC	05	42162	AR
I	23	06	04	42162	IN	COMSG	04	42040	IN

2. T&E DIRECTORATE LOSSES

<u>PH</u>	<u>PARA</u>	<u>LINE</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>	<u>UNIT</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>
II	33	01A	06	H2162	AD	I - T&E Div; II - OTE Div	06	H2162	AD
II	33	02	06	H2162	IN	I - T&E Div; II - COMSG	05	H2162	IN
I	33	03	05	02162	FA	CDEC	05	02162	FA
II	33	04	E8	71L50	NC	I - T&E Div; II - COMSG	E8	71L50	NC
I	33	05	*14	01301	GS	Leavenworth; SAG Fld Off	*14	01515	GS
II	33	06	08	00318	GS	I - T&E Div; II - COMSG	07	00318	GS
I	33	07	05	00312	GS	COMSG	04	00312	GS
II	34	01	06	42610	AR	I - T&E Div; II - INCSG	05	42610	AR
I	34	02	14	01515	GS	HQ SAG T&E Div	14	01515	GS
II	34	03	06	00318	GS	I - T&E Div; II - OTE Div	05	00318	GS
II	34A	01	05	42162	AD	I - T&E Div; II - OTE Div	04	42162	AD

T&E DIRECTORATE LOSSES (continued)

PH	PARA	LINE	GRADE	MOS	BR	TO:	UNIT	GRADE	MOS	BR
I	34A	02	04	02040	IN		COMSG	04	02040	IN
I	34A	03	04	02610	AR		HQCDC, C&D Dir	04	02610	AR
I	34A	04	03	08700	OD		CDEC	03	08700	OD
I	34A	05	E7	71L40	NC		HQCDC, C&D Dir	E7	71L40	NC
I	34A	06	E5	11F20	-		COMSG	E5	11F20	-
II	34A	07	E5	71L20	-		I - T&E Div; II - COMSG	E5	71L20	-
I	34A	07	E5	71L20	-		CDEC	E5	71L20	-
I	34A	08	*13	00525	GS		CDEC	*12	01515	GS
I	34A	09	05	00318	GS		Delete			
II	34B	01	05	42040	AR		I - T&E Div; II - OTE Div	05	42040	AR
II	34B	02	05	08700	EN		I - T&E Div; II - OTE Div	05	08700	EN
I	34B	03	05	42162	QM		PALSG	05	42162	QM
II	34B	04	04	42162	IN		I - T&E Div; II - CONFORG	04	42162	IN
II	34B	05	04	42162	CM		I - T&E Div; II - OTE Div	04	42162	CM
I	34B	06	*13	01515	GS		Leavenworth; SAG Fld Off	*12	01515	GS
II	34B	07	13	01515	GS		I - T&E Div; II - OTE Div	13	01515	GS

T&E DIRECTORATE LOSSES (continued)

PH	PARA	LINE	GRADE	MOS	BR	TO:	UNIT	GRADE	MOS	BR
I	34B	08	*12	01529	GS		Leavenworth; SAG Fld Off	*11	01515	GS
I	34B	09	*13	00802	GS		Lee; SAG Fld Off	*12	01515	GS
I	34B	10	*12	00801	GS		Leavenworth; SAG Fld Off	* 9	01515	GS
I	34B	11	* 9	01082	GS		CDEC	* 9	01515	GS
I	34B	12	*11	00345	GS		CDEC	* 9	01515	GS
I	34B	13	05	00318	GS		HQ SAG T&E Div	04	00318	GS
I	34B	14	04	00322	GS		D E L E T E			
II	34B	14	04	00322	GS		I - T&E Div; II - OTE Div	05	00322	GS
II	35	01	06	02040	06		I - T&E Div; II - COMSG	06	02040	06
I	35	02	*14	01515	GS		Lee; SAG Fld Off	*13	01515	GS
II	35	03	06	00318	GS		I - T&E Div; II - INCSG	06	00318	GS
II	35A	01	05	H2162	IN		I - T&E Div; II - OTE Div	05	H2162	IN
II	35A	02	04	49620	SC		I - T&E Div; II - OTE Div	04	49620	SC
II	35A	03	04	02040	FA		I - T&E Div; II - OTE Div	04	02040	FA
I	35A	04	03	02162	MI		CDEC	03	02162	MI
I	35A	05	05	00318	GS		CDEC	05	00318	GS

T&E DIRECTORATE LOSSES (continued)

PH	PARA	LINE	GRADE	MOS	BR	TO:	UNIT	GRADE	MOS	BR
I	35B	01	05	42040	AR		COMSG	05	42040	AR
I	35B	02	04	62162	FA		CDEC	04	62162	FA
I	35B	03	04	02162	AD		CDEC	04	02162	AD
I	35B	04	05	00318	GS		CDEC	05	00318	GS
I	36	01	06	H2162	IN		I - T&E Div; II - INCSG	06	H2162	IN
II	36	02	05	62162	AD		I - T&E Div; II - OTE Div	05	62162	AD
II	36	03	04	72162	AR		I - T&E Div; II - PALS	04	72162	AR
II	36	04	06	00318	GS		I - T&E Div; II OTE Div	06	00318	GS
II	37	01	06	02040	AR		I - T&E Div; II - PALS	06	02040	AR
II	37	02	05	62162	IN		I - T&E Div; II - OTE Div	05	62162	IN
I	37	03	E5	11F20	-		CDEC	E5	11F20	-
I	37	04	E5	71L20	-		CDEC	E5	71L20	-
I	37	05	*14	01515	GS		CDEC	*14	01515	GS
I	37	06	*13	00802	GS		CDEC	*13	01515	GS
I	37	07	*13	01082	GS		CDEC	*13	01515	GS
I	37	08	*13	00345	GS		CDEC	*12	01515	GS

T&E DIRECTORATE LOSSES (continued)

PH	PARA	LINE	GRADE	MOS	BR	TO:	UNIT	GRADE	MOS	BR
II	37	09	06	00318	GS		I - T&E Div; II - PALS	06	00318	GS
II	37A	01	06	42162	IN		I - T&E Div; II - COMSG	06	42162	IN
I	37A	02	05	42040	AR		COMSG	05	42040	AR
I	37A	03	05	08700	FA		CDEC	05	08700	FA
I	37A	04	04	02040	OD		PALS	04	02040	OD
I	37A	05	04	52040	EN		INCSG	04	52040	EN
II	37A	06	04	62162	TC		I - T&E Div; II - OTE Div	04	62162	TC
I	37A	07	04	02162	MS		PALS	04	02162	MS
I	37A	08	04	42162	QM		CDEC	04	42162	QM
I	37A	09	04	02162	MI		CDEC	04	02162	MI
I	37A	10	E5	71B30	-		CDEC	E5	71B30	-
I	37A	10	E5	71B30	-		CDEC	E5	71B30	-
I	37A	11	*13	01515	GS		Leavenworth; SAG Fld Off	*13	01515	GS
I	37A	12	*12	00301	GS		CDEC	*11	01515	GS
I	37A	12	*12	00301	GS		CDEC	* 9	01515	GS
I	37A	13	05	00318	GS		CDEC	04	00322	GS
I	37B	01	06	42162	AR		CDEC	06	42162	AR
I	37B	02	05	42040	FA		CDEC	05	42040	FA

T&E DIRECTORATE LOSSES (continued)

PH	PARA	LINE	GRADE	MOS	BR	TO:	UNIT	GRADE	MOS	BR
I	37B	03	05	08700	IN		CDEC	05	08700	IN
I	37B	04	04	02040	AD		CDEC	04	02040	AD
II	37B	05	04	52040	EN		I - T&E Div; II - COMSG	04	52040	EN
I	37B	06	04	72162	TC		CDEC	04	72162	TC
I	37B	07	04	09620	SC		INCSG	04	09620	SC
I	37B	08	04	42162	OD		CDEC	04	42162	OD
I	37B	09	04	02162	QM		CDEC	04	02162	OM
I	37B	10	E5	71B30	-		Leavenworth; SAG Fld Off	E5	71B30	-
I	37B	10	E5	71B30	-		CDEC	E5	71B30	-
I	37B	11	*13	01515	GS		Leavenworth; SAG Fld Off	*13	01515	GS
I	37B	12	*12	00301	GS		CDEC	*11	01515	GS
I	37B	13	05	00318	GS		CDEC	04	00322	GS
I	37C	01	06	42162	FA		CDEC	06	42162	FA
I	37C	02	05	42040	IN		CDEC	05	42040	IN
I	37C	03	05	08700	AR		CDEC	05	00700	AR
I	37C	04	04	02040	MI		INCSG	04	02040	MI

T&E DIRECTORATE LOSSES (continued)

PH	PARA	LINE	GRADE	MOS	BR	TO:	UNIT	GRADE	MOS	BR
I	37C	05	04	02040	AD		COMSG	04	02040	AD
I	37C	06	04	62162	TC		CDEC	04	62162	TC
I	37C	07	04	09620	SC		CDEC	04	09620	SC
I	37C	08	04	42162	CM		CDEC	04	42162	CM
I	37C	09	04	02162	MP		CDEC	04	02162	MP
I	37C	10	E5	71B30	-		CDEC	E5	71B30	-
I	37C	10	E5	71B30	-		CDEC	E5	71B30	-
I	37C	11	*12	01515	GS		Leavenworth; SAG Fld Off	*11	01515	GS
I	37C	12	05	00318	GS		D E L E T E			

3. CDEC GAINS

<u>PH</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>	<u>DESCRIPTION</u>
I	06	42162	AR	TBD
I	06	42162	FA	TBD
I	05	08700	FA	OR Analyst (T&E)
I	05	08700	IN	OR Analyst (T&E)
I	05	08700	AR	OR Analyst (T&E)
I	05	42162	AR	TBD
I	05	02162	FA	"
I	05	42040	FA	"
I	05	42040	IN	"
I	04	62162	FA	"
I	04	02162	AD	"
I	04	42162	QM	"
I	04	02162	MI	"
I	04	02040	AD	"
I	04	02162	TC	"
I	04	42162	OD	"

FROM:

<u>PARA</u>	<u>LINE</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>
37B	01	06	42162	AR
37C	01	06	42162	FA
37A	03	05	08700	FA
37B	03	05	08700	IN
37C	03	05	08700	AR
23	02	05	42162	AR
33	03	05	02162	FA
37B	02	05	42040	FA
37C	02	05	42040	IN
35B	02	04	62162	FA
35B	03	04	02162	AD
37A	08	04	42162	QM
37A	09	04	02162	MI
37B	04	04	02040	AD
37B	06	04	72162	TC
37B	08	04	42162	OD

CDEC GAINS (continued)

PH GRADE MOS BR DESCRIPTION

I	04	02162	QM	TBD
I	04	62162	TC	"
I	04	09620	SC	"
I	04	42162	CM	"
I	04	02162	MP	"
I	03	02162	MI	"
I	03	42162	AR	"
I	14	01515	GS	OR Analyst (T&E)
I	13	01515	GS	"
I	13	01515	GS	"
I	12	01515	GS	"
I	12	01515	GS	"
I	11	01515	GS	"
I	11	01515	GS	"
I	9	01515	GS	(Intern)
I	9	01515	GS	(Intern)
I	9	01515	GS	"

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FROM:

PARA	LINE	GRADE	MOS	BR
37B	09	04	02162	QM
37C	06	04	62162	TC
37C	07	04	09620	SC
37C	08	04	42162	CM
37C	09	04	02162	MP
35A	04	03	02162	MI
34A	04	03	08700	OD
37	05	14	01515	GS
37	06	13	00802	GS
37	07	13	01082	GS
37	08	13	00345	GS
34A	08	13	00525	GS
37B	12	12	00301	GS
37A	12	12	00301	GS
37A	12	12	00301	GS
34B	12	11	00345	GS
34B	11	9	01082	GS

CDEC GAINS (continued)

<u>PH</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>	<u>DESCRIPTION</u>
I	E5	71L20	-	Clk-Typist
I	E5	71L20	-	Clk-Typist
I	E5	71L20	-	Clk-Typist
I	E5	71B30	-	Clk-Typist
I	E5	71B30	-	Clk-Typist
I	E5	71B30	-	Clk-Typist
I	E5	71B30	-	Clk-Typist
I	E5	71B30	-	Clk-Typist
I	O5	00318	GS	Sec-Steno
I	O5	00318	GS	Sec-Steno
I	O4	00322	GS	Clk-Typist
I	O4	00322	GS	Clk-Typist

4. HQ SAG T&E DIVISION GAINS:

<u>PH</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>	<u>DESCRIPTION</u>
I	14	01515	GS	OR Analyst (T&E)
I	O4	00312	GS	Clk-Typist

FROM:

<u>PARA</u>	<u>LINE</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>
34A	07	E5	71L20	-
37	03	E5	11F20	
37	04	E5	71L20	
37A	10	E5	71B30	
37A	10	E5	71B30	
37B	10	E5	71B30	
37C	10	E5	71B30	
37C	10	E5	71B30	
35A	05	05	00318	
35B	04	05	00318	
37A	13	05	00318	
37B	13	05	00318	-

FROM:

<u>PARA</u>	<u>LINE</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>
34	02	14	01515	GS
34B	13	05	00318	GS

5. SAG LEAVENWORTH FIELD OFFICE GAINS

<u>PH</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>	<u>DESCRIPTION</u>
I	14	01515	GS	OR Analyst (T&E)
I	13	01515	GS	OR Analyst (T&E)
I	13	01515	GS	"
I	12	01515	GS	"
I	11	01515	GS	"
I	11	01515	GS	"
I	09	01515	GS	" (Intern)
I	E5	71B30		Clk-Typist

6. SAG LEE FIELD OFFICE GAINS

<u>PH</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>	<u>DESCRIPTION</u>
I	13	01515	GS	OR Analyst (T&E)
I	12	01515	GS	"

7. HQCDC C&D DIRECTORATE GAINS

<u>PH</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>	<u>DESCRIPTION</u>
I	04	H2610	AR	Cbt Data Officer
I	E7	71L40	NC	Adm Supv

FROM:

<u>PARA</u>	<u>LINE</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>
33	05	14	01301	GS
37A	11	13	01515	GS
37B	11	13	01515	GS
34B	06	13	01515	GS
37C	11	12	01515	GS
34B	08	12	01529	GS
34B	10	12	00801	GS
37B	10	E5	71B30	-

FROM:

<u>PARA</u>	<u>LINE</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>
35	02	14	01515	GS
34B	09	13	00802	GS

FROM:

<u>PARA</u>	<u>LINE</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>
34A	03	04	02610	AR
34A	05	E7	71L40	NC

8. HQ COMSG GAINS

<u>PH</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>	<u>DESCRIPTION</u>
I	05	H2040	AR	Test Off
I	05	42040	AR	Test Off
I	04	02040	IN	Test Off
I	04	02040	AD	Test Off
I	04	42040	IN	Test Off
I	E5	71L20	-	Clk-Typist
I	04	00312	GS	Sec-Steno
II	05	H2162	IN	CD Staff Off
II	05	H2040	IN	Test Officer
II	04	42162	IN	CD Staff Off
II	04	52040	EN	Test Off
II	E7	71L50	NC	Admin Supv
II	E5	71L20	NC	Admin Spec
II	05	00318	GS	Sec-Steno

FROM:

<u>PARA</u>	<u>LINE</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>
35B	01	05	H2040	AR
37A	02	05	42040	AR
34A	02	04	02040	IN
37C	05	04	02040	AD
23	06	04	42162	IN
34A	06	E5	11F20	-
33	07	05	00312	GS
33	02	06	H2162	IN
35	01	06	02040	IN
37A	01	06	42162	IN
37B	05	04	52040	EN
33	04	E8	71L50	NC
34A	07	E5	71L20	NC
33	06	08	00318	GS

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9. HQ INCSG GAINS

<u>PH</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>	<u>DESCRIPTION</u>
I	04	52040	EN	Test Off
I	04	09620	SC	Communication & Intel Off
I	04	H2040	MI	Test Off
II	05	H2162	IN	CD Staff Off
II	04	42610	AR	Mgmt Analyst
II	04	00318	GS	Sec-Steno

10. HQ PALSG GAINS

<u>PH</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>	<u>DESCRIPTION</u>
I	05	42162	QM	CD Staff Off
I	04	H2040	OD	Test Off
I	04	02162	MS	CD Staff Off
II	05	H2040	TC	Test Off
II	04	H2162	QM	CD Staff Off
II	05	00318	GS	Sec-Steno

FROM:

<u>PARA</u>	<u>LINE</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>
37A	05	04	52040	EN
37B	07	04	09620	SC
37C	04	04	02040	MI
36	01	06	H2162	IN
34	01	06	42610	AR
35	03	06	00318	GS

FROM:

<u>PARA</u>	<u>LINE</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>
34B	03	05	42162	QM
37A	04	04	02040	OD
37A	07	04	02162	MS
37	01	06	02040	AR
36	03	04	02162	AR
37	09	06	00318	GS

11. HQ CONFORG GAINS

PH	GRADE	MOS	BR	DESCRIPTION
II	04	52162	IN	CD Staff Off

FROM:

PARA	LINE	GRADE	MOS	BR
34B	04	04	42162	IN

12. DCSOPS T&E DIVISION - PHASE I (T&E DIRECTORATE RESIDUAL)

PH	GRADE	MOS	BR	DESCRIPTION
I	06	H2162	AD	Director of T&E
I	13	01515	GS	OR Analyst (T&E)
I	E8	71L50	NC	Admin Supv
I	07	00318	GS	Sec-Steno
I	05	42610	AR	Chief, Plans & Programs Div
I	04	H2162	AD	Mgmt Analyst
I	04	08700	EN	OR Analyst (T&E)
I	E5	71L20	NC	Admin Spec
I	05	00318	GS	Sec-Steno
I	06	H2040	IN	Chief, OTE Div
I	05	42020	AR	Test Off
I	05	H2162	AD	CD Staff Off
I	04	42162	IN	CD Staff Off

FROM:

PARA	LINE	GRADE	MOS	BR
33	01A	06	H2162	AD
34B	07	13	01515	GS
33	04	E8	71L50	NC
33	06	08	00318	GS
34	01	06	42610	AR
34A	01	05	42162	AD
34B	02	05	08700	EN
34A	07	E5	71L20	NC
34	03	06	00318	GS
35	01	06	02040	IN
34B	01	05	42040	AR
33	02	06	H2162	IN
34B	04	04	42162	IN

T&E DIRECTORATE RESIDUAL (continued)

<u>PH</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>	<u>DESCRIPTION</u>
I	04	42162	FA	CD Staff Off
I	05	00318	GS	Sec-Steno
I	06	42162	IN	Chief, MASSTER Coord Div
I	05	H2162	IN	CD Staff Off
I	04	49620	SC	Communication & Intel Off
I	04	02040	MI	Test Off
I	06	00318	GS	Sec-Steno
I	06	H2162	IN	Chief, Fld Experimentation Div
I	05	62162	AD	CD Staff Off
I	04	02162	AR	CD Staff Off
I	06	00318	GS	Sec-Steno
I	06	H2040	AR	Chief, Fld Opn Div
I	05	62162	IN	CD Staff Off
I	04	62162	TC	CD Staff Off
I	04	52040	EN	Test Off
I	06	00318	GS	Sec-Steno

FROM:

<u>PARA</u>	<u>LINE</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>
34B	05	04	42162	CM
34B	14	04	00318	GS
37A	01	06	42162	IN
35A	01	05	H2162	IN
35A	02	04	49620	SC
35A	03	04	02040	MI
35	03	06	00318	GS
36	01	06	H2162	IN
36	02	05	62162	AD
36	03	04	02162	AR
36	04	06	00318	GS
37	01	06	02040	AR
37	02	05	62162	IN
37A	06	04	62162	TC
37B	05	04	52040	EN
37	09	06	00318	GS

13. OTE DIVISION DCSOPS

<u>BR</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>	<u>DESCRIPTION</u>
II	06	42162	AD	Chief, DCSOPS OTE Div
II	05	H2162	AD	Mgmt Analyst
II	05	42040	AR	Test Off
II	05	H2162	IN	CD Staff Off
II	05	62162	IN	CD Staff Off
II	05	62162	AD	CD Staff Off
II	04	08700	EN	OR Analyst (T&E)
II	04	02040	MI	Test Off
II	04	62162	TC	CD Staff Off
II	04	49620	SC	Communication & Intel Off
II	04	42162	FA	CD Staff Off
II	13	01515	GS	OR Analyst (T&E)
II	06	00318	GS	Sec-Steno
II	04	00318	GS	Sec-Steno
II	04	00322	GS	Sec-Steno

FROM:

<u>PARA</u>	<u>LINE</u>	<u>GRADE</u>	<u>MOS</u>	<u>BR</u>
33	01A	06	H2162	AD
34A	01	05	42162	AD
34B	01	05	42040	AD
35A	01	05	H2162	IN
37	02	05	62162	IN
36	02	05	62162	AD
34B	02	05	08700	EN
35A	03	04	02040	MI
37A	06	04	62162	TC
35A	02	04	49620	SC
34B	05	04	42162	CM
34B	07	13	01515	GS
34	03	06	00318	GS
36	04	06	00318	GS
34B	14	04	00322	GS

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ANNEX E TO SATE STUDY GROUP REPORT

ORGANIZATION OF HQ CDC

1. General. The CDC reorganization of 1971 established systems oriented groups and introduced a new concept for managing combat development actions. The groups commanders were designated Lead Horses for those programs assigned to them by means of Command Guidance Memoranda (CGM) and given responsibility for the detailed management of assigned programs. To insure that combat developments continued on schedule as the groups got organized and picked up management by CGM program, the developmental directorates within headquarters CDC continued to function as a review, monitoring and coordinating element. From the beginning of reorganization it was planned to reduce the size of HQ CDC, and transfer responsibilities for detailed management and staff review to the groups. This reduction in HQ CDC operations is referred to as Phase II Reorganization. CDC is committed in writing to DA, and personally to the Chief of Staff, Army, to continue with Phase II reorganization as soon as the groups are organized and staffed to take over detailed management.

2. Assumptions of Phase II Reorganization. Phase II planning has been based on the following assumptions:

- a. Group commanders will manage programs as assigned by CGM through the Lead Horse Concept.
- b. Under the Lead Horse Concept, HQ CDC does not need managers to duplicate the functions performed by the Lead Horse at each group.

c. The lateral tasking of one group by another, within workload limits established in CGM, will require a responsive mechanism at HQ CDC to resolve conflicting requirements.

d. HQ CDC will continue to develop command priority objectives.

e. HQ CDC will develop the definition and general outline of programs to be managed by CGM. Proponent groups will do the detailed CGM planning.

f. HQ CDC will continue to secure and allocate resources for the command.

g. HQ CDC should not be involved in operations or the production of combat development products. This includes planning and conduct of Test and Evaluation, production of TOE and analysis of intelligence and threat data for use by the command.

h. Because of high cost or critical availability, certain skills and resources will require special management, which may include consolidation or centralized command. These skills and resources may include ORSA, war gaming, computer time or test and experimentation expertise.

i. All personnel authorizations made available within the headquarters during Phase II will be transferred to the groups, once known strength reductions and special OTE requirements have been met.

3. Constraints on Headquarters Restructuring.

a. The type Lead Horse Concept adopted by CDC will have a major impact on the size of the headquarters. A small headquarters is possible only if most staff action is done by group headquarters for the command.

b. CDC has committed itself during Phase I Reorganization to a reduced headquarters with increased responsibility by the groups. Phase II actions which reverse this trend will require additional reorganization effort to redirect programs and staff procedures already converted. This commitment includes

elimination of the developmental directorates within HQ CDC, and management of the combat development process by systems which include a number of combat development actions.

c. The automated production of organizational documents (the automated TOE and BOIP program) requires central management of the production capability which is within access of all developmental groups. The best disposition of this capability would be to locate it in some centralized organization outside of the headquarters and the developmental groups.

d. Intelligence analysis and development of threat information to be used in the development of concepts, doctrine and materiel needs should be centralized at some location with efficient access to the intelligence community.

e. Reductions in the total civilian strength of CDC have been imposed by DA for implementation prior to 30 Jun 72. This reduction, totaling 79 authorized spaces for the command as a whole, can be applied selectively to reduce the strength of the headquarters or eliminate selected functions within the command. This will support the shift of responsibility for management of CGM programs from the headquarters to the groups, even though it may limit the personnel authorizations available to be transferred to the groups.

f. By separate action, DA has directed that the average civilian grade of CDC be reduced by approximately 1/2 grade. This action will require extensive analysis to achieve the reduced grade average without creating imbalanced capabilities within the command. Implementation of this grade reduction will require the release of some civilians. This action may support transfer of functions and responsibilities to the groups, but the need to reduce average grade in each element of the command will limit this support.

g. A third civilian manpower action imposed by DA is the reduction of civilians in the National Capital Region (NCR). This action has imposed a limit of 440 civilians on all CDC activities in the NCR. To reach this limit by 30 June 1972, the command must leave all authorized vacancies unfilled and move from the NCR or release 59 civilian personnel. This constraint on manpower in the NCR supports the shift of functions and associated resources out of the Washington area to CDEC, COMS Gp, PALS Gp, or SSI.

4. Current Headquarters Organization.

a. As a result of partial implementation of the headquarters portions of the reorganization of 1971, the concept of operations has not been fully implemented as planned. This concept envisioned a reduction in the strength of the Headquarters developmental staff during FY 1972 in order to provide resources to the groups to carry out the increased production and staff responsibilities established by the CGM program.

b. As an interim measure, to insure that critical combat development actions were not delayed by the turbulence resulting from simultaneous reorganization of both group and headquarters CDC staffs, this transfer of resources was delayed. The DCSOPS was established within HQ CDC to draft CGM and begin to centralize management of the operational program, but the strength of the DCSOPS remains below the level originally planned for. Tasking authority has been centralized in the DCSOPS, but the strength of the developmental directorates remains virtually unchanged. Responsibility for final command action on many combat development actions has been passed to group commanders with the publication of CGM, but staffing procedures have not been changed, and the workload within the headquarters directorates is still as high as before reorganization began.

c. CDC strength as of 31 Dec 71 is summarized below.

<u>UNIT</u>	<u>AUTHORIZED</u>	<u>ASSIGNED</u>	<u>OVER (SHORT)</u>
HQ CDC	644	749	+ 105
COMS	808	805	(-3)
INCS	325	341	+ 16
PALS	461	463	+ 2
CONFOR	305	275	(-30)
SAG	139	136	(-3)
SSI	31	33	+ 2
CDEC	<u>2846</u>	<u>2821</u>	<u>(-25)</u>
TOTAL	5559	5623	+ 64

d. Headquarters CDC continues to have the greatest overstrength of any unit of the command. Temporary overstrength during the transition of reorganization is not unusual, but the current trend gives no indication that these overstrengths are temporary.

e. Within the present headquarters there are three elements primarily concerned with the production of combat development products, rather than management of the combat development process. These activities with their authorized strengths are:

(1) OTE Teams (45 of the 102 personnel in T&E Directorate)

(2) Organizational document production (29 of the 50 personnel in Organization Directorate).

(3) Intelligence and Threat Analysis (14 personnel, Intel & Threat Division, Concepts & Doctrine Directorate).

f. To date, six approved CGM have been published. Personnel within the headquarters associated with the management of actions contained in these programs have not been transferred to maintain a balanced workload. The approved CGM, proponent group and associated headquarters personnel are:

	<u>CGM</u>	<u>Lead Horse</u>	<u>Possible HQ Personnel for Groups</u>
1-72	Integrated Battlefield Control Sys	INCS	(2)
2-72	Intelligence/STANO	INCS	(4)
3-72	Tank/ Anti-tank	COMS	(5)
4-72	Communications-Electronics	INCS	(4)
5-72	Airmobility	COMS	(6)
6-72	Civil Disturbance/ Emergency Opn	COMS	(1)

g. Given these initial conditions, alternative headquarters configurations were developed during the SATE study to provide comparative structures for evaluating proposed distribution of Systems Analysis and Test & Evaluation functions and associated resources.

5. Alternatives for Headquarters Organization. When considering the detailed organization, the variety of headquarters configurations available to the command is virtually without limit. The SATE Study Group considered three general alternatives for headquarters configuration to determine the impact of alternative concepts of operation on the structure of HQ CDC during Phase II Reorganization. Under each alternative the headquarters retains sufficient resources to continue the Comptroller, administrative and logistics functions currently being performed. Only the operational elements of HQ CDC are discussed in the alternatives presented and analyzed below. Once headquarters reorganization is complete, administrative and support resources must be balanced to meet the new requirements. This may result in some personnel becoming available for transfer to the groups. Since headquarters administration and support workload is generally determined by the

size of the command as a whole, and CDC strength in the NCR, savings in administrative personnel will be few if any.

a. Alternative I. Small Headquarters. Under this alternative operational elements of the headquarters will be reduced to the minimum size necessary to perform essential functions to guide and coordinate the actions of the developmental groups working as strong lead horses. This will require a DCSOPS of less than 100 people, organized generally as shown in Figure E-1.

ALTERNATIVE I - SMALL HEADQUARTERS
(DCSOPS less than 100)

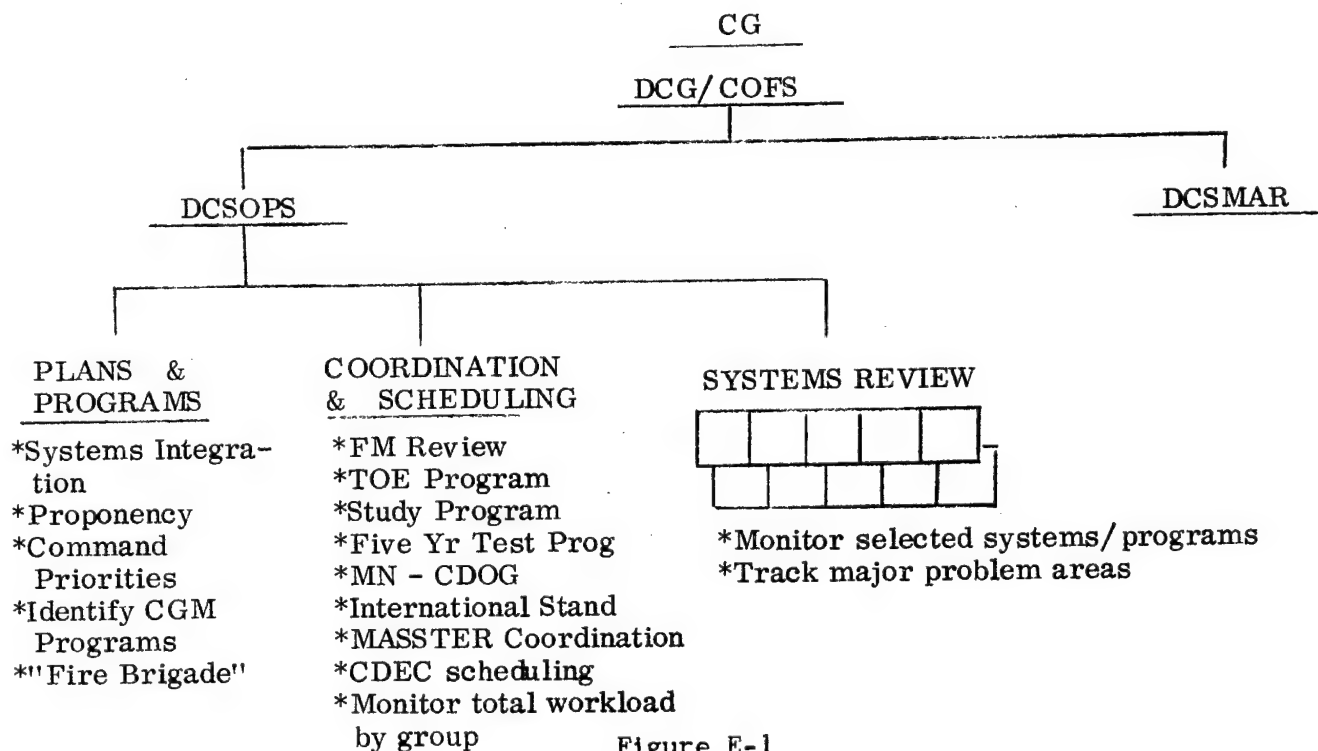


Figure E-1

(1) This headquarters will have the following characteristics:

(a) SYSTEMS REVIEW. A small element to monitor the progress of selected systems or programs. This element will track on major significant problem areas to provide the CG with a consolidated source within the headquarters of information on the most critical problem areas of the command.

(b) PLANS & PROGRAMS. An element to identify the priority objectives of the command, monitor the combat development process at the DA level to identify and define CGM programs and prepare draft CGM. This element is a pool of experienced planners who are concerned with the total role of CDC in the combat development process, and able to integrate the various systems under development into a unified effort. This element will have the responsibility to deal with questions of proponentcy for programs, or for the assignment of new actions to a particular program. Personnel from this element are available to provide the leadership for high level, quick reaction, "Fire Brigade" actions for the command group.

(c) SCHEDULING AND COORDINATION. An element to monitor those product oriented programs that involve more than one group, or require special scheduling at headquarters level. The activities of this element will include procedural review of the FM program, TOE review program, status of Materiel Needs and Combat Development Objectives Guide (CDOG), and international standardization program. This element will also maintain the schedules for the Five year test program, coordinate MASSTER testing and the CDEC experimentation schedule, and monitor the workload of subordinate groups to insure effective distribution of resources in accordance with the overall priorities of the command.

(2) This headquarters will not be organized or staffed to review actions and develop command positions for the approval of the command group. Under this alternative, staff analysis of particular actions will be done by the staff at group level, and presented at HQ CDC by the group staff whenever such presentation is required. This elimination of product oriented action officers from the headquarters will require that the group commanders be designated as Deputy Commanding Generals within proponent areas so that their staffs function as part of the headquarters staff.

(3) In order to perform these expanded staff functions group headquarters will require additional resources and expanded responsibilities.

(4) This alternative requires rapid response from the group staffs to requirements from the CDC command group. This response will be possible only if the group headquarters is located close enough to HQ CDC to permit close and continuous coordination. The present location of INCS and CONFOR Groups in the National Capitol Region does permit this coordination. PALS Group is in a less convenient position but close enough, within two hours travel time, and located with other elements of the logistics community. COMS Group headquarters at Ft Leavenworth, Kansas, is not close enough to provide the responsive coordination required under this alternative. The small headquarters concept is feasible only if HQ COMS Group is located in or near the NCR. This relocation is possible under this option by taking advantage of the reduction in the size of the headquarters to move HQ COMS Group, less operational elements, into the facilities currently occupied by part of the headquarters. A relocation of this magnitude will require detailed planning to accomplish under the current restrictions on civilians in the NCR, and total authorization reductions being imposed by HQ DA.

(5) This alternative provides the highest production to overhead ratio, makes available the greatest number of personnel for assignment to the groups, but will require the greatest personnel and operational turbulence to accomplish.

b. Alternative II. Moderate Headquarters. This alternative represents the stated goals of the reorganization of 1971, with a DCSOPS large enough to monitor the operations of the command, and provide intensive staff management, review and coordination of selected, high priority (Significant Action List (SAL)) items. This alternative is associated with a moderately strong Lead Horse who has responsibility for detailed management by CGM, but must be supported with critical resources such as ORSA and Test & Evaluation expertise. Under this alternative the headquarters

will have a DCSOPS strength of approximately 150, organized generally as shown in Figure E-2.

ALTERNATIVE II - MEDIUM HEADQUARTERS
(DCSOPS approx 150)

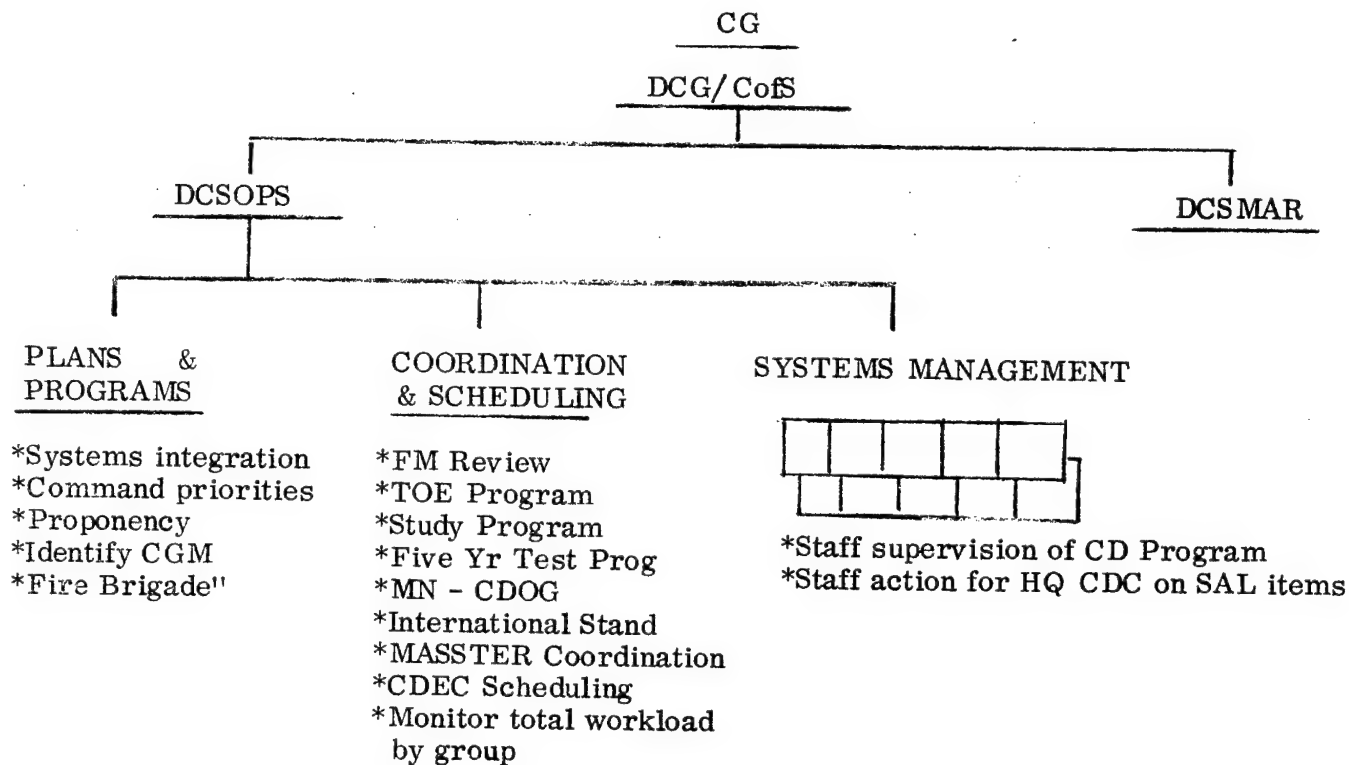


FIGURE E-2

(1) This headquarters will have the following characteristics:

(a) PROGRAM MANAGEMENT. Under this alternative, this element provides staff supervision of the total combat development program. Many internal structures are possible for this element. It may be organized to track on group areas of responsibility, CGM programs, combat development product areas (doctrine, organization, materiel, T&E), general systems (functional, materiel, unit), or echelons of the Army (Division, corps & Field Army, Theater Army). Implementation

of this alternative will require detailed planning to insure that the management structure in this element provides total coverage of the combat development process without unnecessary duplication of the functions of the group commanders or CGM management structure at the group level. The easiest structure to implement would be transition to a program management office for each CGM as it is published, with a corresponding reduction of the developmental directorates.

(b) PLANS & PROGRAMS. An element to identify the priority objectives of the command and monitor the combat development process at DA level to identify and define CGM. If Program Management is organized to track on CGM, draft CGM would be prepared by that element, otherwise they would be prepared by this element. This element is a pool of experienced planners who are concerned with the total role of CDC in the combat development process and able to integrate the various programs and systems under development into a unified effort. This element will have the responsibility to deal with questions of pro ponency for programs, or for the assignment of new actions to a particular program. Personnel from this element are available to provide leadership for high level, quick reaction, "Fire Brigade" actions for the command group.

(c) SCHEDULING AND COORDINATION. An element to monitor those product oriented programs that involve more than one group, or require special scheduling at headquarters level. The activities of this element will include procedural review of the FM program, TOE review program, status of Materiel Needs and Combat Developments Objectives Guide (CDOG) and international standardization program. This element will also maintain the schedules for the Five year test program, coordinate MASSTER testing and the CDEC experimentation schedule, and monitor the workload of subordinate groups to insure effective distribution of resources in accordance with the overall priorities of the command.

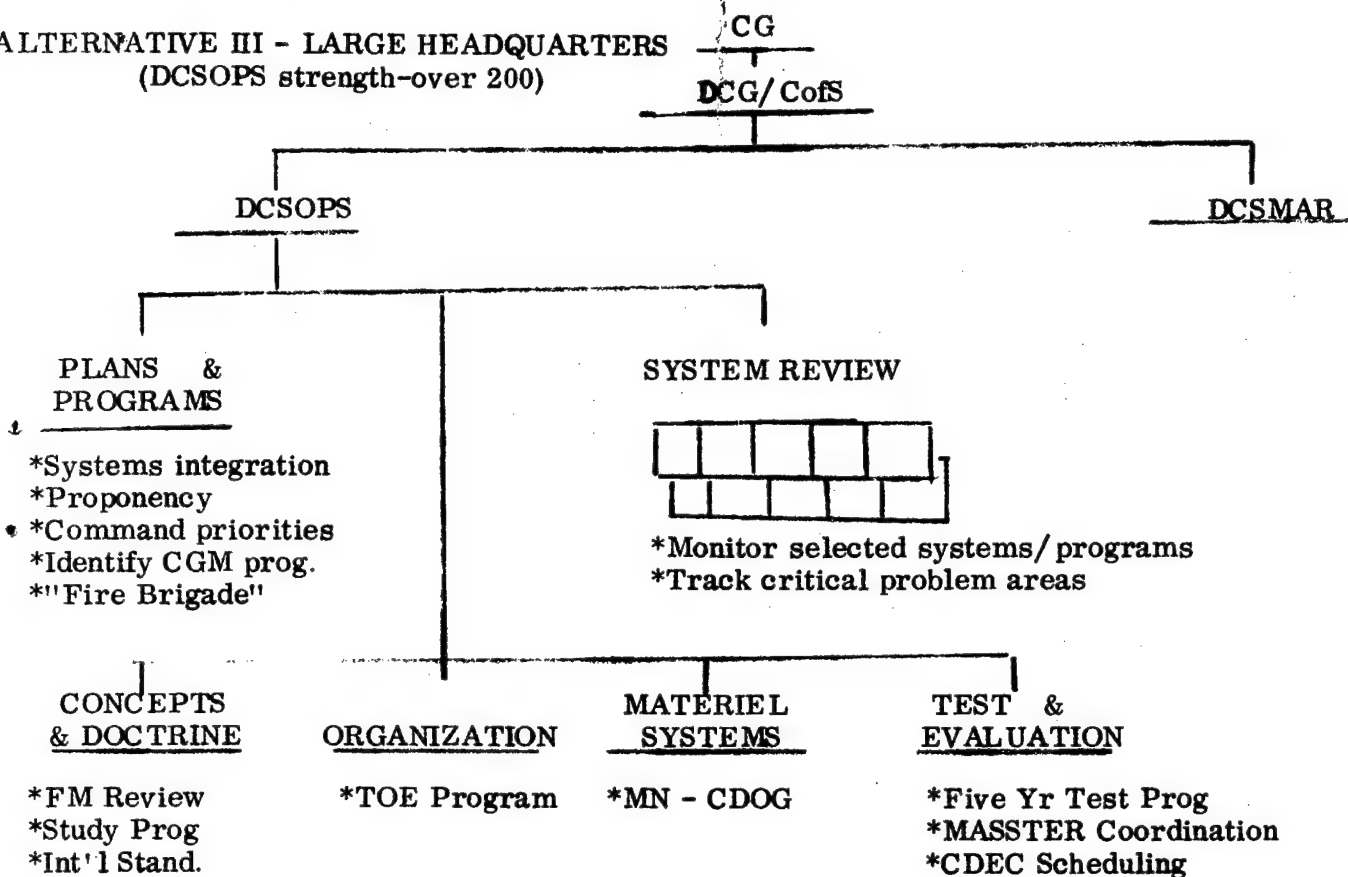
(d) Under this alternative there are no developmental directorates within HQ CDC. All operational matters requiring staff action at headquarters CDC level will be processed within DCSOPS. DCSOPS will be organized and staffed to review SAL actions and develop command positions on those actions for approval of the command group. Staff analysis, and coordination for the command for all non-SAL actions will be accomplished at group level, Command approval of these actions is the responsibility of the Lead Horse group commander, acting for the CG, CDC.

(2) In order to perform these staff functions, the DCSOPS in this alternative must be larger than in Alternative I. This will reduce the resources available for transfer to the groups to some extent, but not entirely.

(3) As the planned goal for headquarters structure during the 1971 reorganization, implementation of this alternative will require the least departure from the announced concept of operations of the command. The medium headquarters can be considered as a phased approach to a small headquarters/ strong lead horse configuration. It can be implemented without relocation of COMS Group headquarters to the NCR but does not preclude future relocation if this action is desired.

c. Alternative III. Large Headquarters. This alternative represents the current actual structure of CDC headquarters, reduced by enough manpower to absorb DA imposed strength cuts, and to transfer to the groups the minimum manpower resources to perform increased T&E staff functions. This alternative is associated with a relatively weak lead horse and the continuation of developmental staff sections, under the DCSOPS, totalling more than 200 individuals. The organization of this headquarters is indicated in Figure E-3.

ALTERNATIVE III - LARGE HEADQUARTERS
(DCSOPS strength-over 200)



(1) This headquarters will have the following characteristics:

(a) A functional staff to supervise the total combat development process. These elements will retain responsibility for coordinating those programs that involve more than one group or require special scheduling at headquarters level.

(b) SYSTEMS REVIEW. These offices will be organized to monitor the progress of selected systems or programs, tracking on major significant problem areas to provide the CG with a central, consolidated source within the headquarters of information and staff expertise on the most critical actions of the command.

(c) PLANS AND PROGRAMS. An element to identify the priority objectives of the command, monitor the combat development process at the DA level to identify and define CGM programs and chair the headquarters committee that prepares each draft CGM. This element is a pool of experienced planners who are concerned with

the total role of CDC in the combat development process, and able to integrate the various systems under development into a unified effort. This element will have the responsibility to deal with questions of proponency for programs, or for the assignment of new actions to a particular program. Personnel from this element are available to provide the leadership for high level, quick reaction, "Fire Brigade" actions for the command group.

(2) This headquarters will retain the relatively strong capability for staff action and review of individual combat development actions. It represents a reversal of the objectives of the reorganization of 1971. It provides the least help for the group commanders, and places them in the weakest position as managers of assigned CGM.

(3) This alternative can be implemented with the least personnel turbulence, but will require revision of the command publications establishing the concept of operations.

6. Comparison of Alternatives.

a. Alternative I - Small HQ.

(1) Advantages

- (a) Greatest reduction of personnel in NCR.
- (b) Concentrates production at group.
- (c) Creates strong Lead Horse.
- (d) Eliminates managers at HQ CDC to duplicate group management.
- (e) Removes HQ from production.
- (f) Implements announced Phase II planning.
- (g) Creates room at Fort Belvoir for CO MSG HQ.

(2) Disadvantages

(a) Coordination of COMSG programs is difficult unless COMS HQ moves to NCR.

(b) Fragments ORSA and T&E assets.

(c) Requires greatest personnel and operational turbulence.

b. Alternative II - Medium HQ.

(1) Advantages

(a) Can be organized to eliminate managers at HQ CDC duplicating group management.

(b) Removes HQ from production.

(c) Implements announced Phase II planning.

(d) Permits consolidation of ORSA and T&E assets.

(2) Disadvantages

(a) Does not concentrate production at group.

(b) Coordination of COMSG programs is difficult unless COMS HQ moves to NCR.

(c) Does not provide spaces for immediate relocation of COMS Gp HQ to Ft Belvoir.

c. Alternative III - Large HQ.

(1) Advantages

(a) Permits consolidation of ORSA assets.

(b) Permits consolidation of T&E assets.

(c) Requires least personnel turbulence.

(2) Disadvantages

(a) Least reduction in HQ size.

(b) Coordination of COMSG programs is difficult.

(c) Duplication of staff effort between HQ and Groups.

(d) Splits OTE personnel between Groups and T&E organization.

(e) Does not implement announced Phase II programs.

7. Observations.

a. Final decision on the detailed structure of HQ CDC is based on factors beyond the scope of this study.

b. Personnel actions to comply with strength and average grade limitations imposed by HQ DA must be initiated by 15 Feb 72, in order to complete necessary reduction in force actions by 30 Jun 72.

c. Under each alternative, TOE production and Intelligence and Threat Analysis can and should be removed from the headquarters organization.

d. The test and evaluation personnel spaces have not been filled, and with the current restriction on civilians in the NCR, cannot be filled as long as those spaces remain in the headquarters TDA.

e. Personnel actions are being coordinated to insure minimum adverse impact on the command.

f. The shift to a systems management approach by DCSOPS is most efficient if phased to the publication of CGM. One immediate action that can be taken to begin implementation of Alternative II, is the creation of CGM offices in the DCSOPS for those 6 CGM which have been published, and immediate transfer to the groups of the 11 spaces made available within the developmental directorates by this action.

g. The relocation of COMS Group headquarters to Ft Belvoir is possible if headquarters CDC is reduced sufficiently, and should be studied in detail to determine the total balance of costs and benefits to the command of such an action.

h. The commitment to decentralized management favors Alternative I. This alternative is the most desirable headquarters from a management perspective, but represents the greatest personnel and operational turbulence in execution. Alternative II represents an easier solution to implement, and one that permits later adjustment toward the structure of Alternative I.

8. Conclusions.

- a. Alternative II is the most feasible headquarters structure for Phase II reorganization.
- b. Civilian personnel actions must be completed before Phase II is implemented, and must be structured to support Alternative II.
- c. HQ reorganization should be phased with the publication of CGM.
- d. Immediate action should be taken to create program management offices in DCSOPS for CGM already published, and transfer to the groups the resources associated with those programs in the developmental directorates.